

Response to Comments Document
PSEG Nuclear, LLC - Salem Generating Station

A draft NJPDES permit for the above referenced facility was issued by the New Jersey Department of Environmental Protection (hereafter “the Department” or “NJDEP”) on December 8, 2000. The public comment period on the draft NJPDES permit closed on March 14, 2001. During this period, the Department took testimony at two non-adversarial public hearings, which were stenographically recorded and transcribed, and received written comments from numerous parties. The full text of the transcripts and all of the written comments have been entered into the Administrative Record for this final permit, consistent with N.J.A.C. 7:14A-15.17. The Administrative Record is available for review at the Department’s Central File room at 401 East State Street in Trenton. Appointments can be made to review the Administrative Record by calling (609) 292-0400. The Administrative Record contains complete copies of all written comments as well as testimony offered at the two public hearings.

The Department has included a list of all persons who submitted comments and/or testimony as Table 1. Several commentors limited their comments to the Estuary Enhancement Program (EEP), which is the program that was established by PSEG to implement specific conditions of the July 20, 1994 NJPDES permit including, but not limited to, the wetlands restoration conditions and fish ladder requirements. Some of the individuals or groups that testified at the public hearings also submitted written comments. Commentor numbers have been assigned generally based on the order in which letters were received by the Department. If a person submitted written comments as well as testimony at the public hearing under the same affiliation, then that person was assigned one commentor number. However, if the same person submitted comments and/or testimony under different affiliations (e.g. as a resident and as a representative of an environmental commission) then that person was assigned a commentor number for each affiliation.

The Department has summarized the written comments and public testimony received on the draft NJPDES permit. In its summary of comments, the Department has identified the commentors by their respective commentor numbers for the various issues. To the best extent practicable, the Department has grouped the comments according to underlying issues as follows:

	<u>Comment Numbers</u>
Comments and NJDEP Responses to Comments	
General Issues associated with the station	1 - 5
Application of Section 316(b)	6 - 22
Estuary Enhancement Program (EEP)	23 - 61
<i>Phragmites australis</i> (<i>Phragmites</i>) Control	62 - 70
Additional EEP Conditions	71 - 76
EEP as Mitigation	77 - 84
Adverse Environmental Impacts	85 - 89
Impingement / Entrainment Losses and Loss Analyses	90 - 99
Issues Associated with Application Review and NJPDES Application	100 - 114
Alternative Intake Technologies	115 - 132
Biological Monitoring	133 - 143
Specific Permit Comments by Interested Parties	144 - 156
Specific Permit Comments by PSEG	PSEG Comment 1 – PSEG Comment 42
Other Permit Changes Incorporated by NJDEP	NJDEP Comment 1 – NJDEP Comment 2

Table 1

Written Comments Submitted Prior to March 14, 2001		
Person Commenting	Affiliation / Title	Commentor Number
Clifford Day	US Dept. of Interior, US Fish and Wildlife Service	1
Judith Weiss	Professor, Department of Biological Sciences - Rutgers Newark	2
Mary Alessio-Leck	Professor of Biology, Rider University	3
Ella Fillipone	Executive Administrator, Passaic River Coalition	4
J. Burger	Distinguished Professor of Biology – Rutgers University	5
Joan Egerton	Chair, Fairfield Twp. Environmental Comm.	6
Franklin E. Parker	The Trust for Public Land	7
Al Tulini	NJ State Chairman, Ducks Unlimited Inc.	8
John Kraeuter	Haskin Shellfish Research Lab	9
Ralph Pepe*	Resident of Region	10
Joan H. Egerton	Resident of Cumberland County	11
Greg Crossland*	Resident of Region	12
Robert F. Scott*	Resident of Region	13
Dr. Chris Fitter*	Associate Professor of English, Rutgers University - Camden	14
Matt Urban*	Resident of Region	15
Dr. Susan G. Burger*	Resident of Region	16
Henry R. DeGregorio*	Resident of Region	17
Daniel E. Farkas*	Resident of Region	18
Laura A. Ashby*	Resident of Region	19
Loretta Dunne*	Resident of Region	20
Ronald Riggins	Mayor, Maurice River Township	21
Marie A. Curtis	Executive Director, NJ Environmental Lobby	22
Maureen Ogden	No stated affiliation	23
Michael A. Pirolli	Mayor, City of Bridgeton	24
William F. Siemion*	Resident of Region	25
Dean Talcott	Fanwood Environmental Commission	26
David F. Moore	Former Exec. Director, NJ Conservation Foundation / Former Chair, NJ Tidelands Council	27
Jane Morton Galletto	President, Citizens United	28
Mary J. Whiteman*	Homeowner, Wayne, PA and Stone Harbor, NJ	29
Julia M. Somers	Executive Director, Great Swamp Watershed	30
JoAnn Seaver*	Resident of Region	31
Cpt. G. Kumor	Fisherman, Member of Weakfish Committee	32
George and Anna Kumor	Owner of Properties in Maurice River Township	33
George P. Howard	Executive Director, NJ State Federation of Sportsmen's Clubs, Inc.	34
Sally Dudley	Executive Director, Association of NJ Environmental Commissions	35
Paula Emond*	Resident of Region	36
Edward Emond*	Resident of Region	37
David C. Leusner*	Resident of Region	38
Bob Golding*	Resident of Region	39
Kevin S. Lauhon*	Resident of Region	40
Francis J. Belusik*	Member – Saltwater Anglers Club of Southern NJ	41
12 Members	Dutch Neck Busters Hunt and Fishing Club	42
Minnie Shinherwitz*	No stated affiliation	43
Horace E. McCurdy*	No stated affiliation	44
Charles Szulczewski*	No stated affiliation	45

Person Commenting	Affiliation / Title	Commentor Number
Charles B. Tomlinson	No stated affiliation	
Louis Falcone*	No stated affiliation	47
Everett F. Gregory*	No stated affiliation	48
Cindy O'Connor	Executive Director, Wetlands Institute	49
Barbara A. Wright	City Clerk, City of Salem	50
Patricia A. Kurkul	Regional Administrator, US Department of Commerce, NOAA	51
Richard Sullivan	Environmental Advisor	52
James T. Brandt	No stated affiliation	53
Carol Coleman*	No stated affiliation	54
Lillian Snyder*	Resident of Region	55
Susan Young*	Resident of Region	56
J. Morford, C. Wowkanech, J. Spinnanger	NJ Society for Environmental, Economic Development	57
L. Brennan and C. Wowkanech	NJ State AFL CIO	58
Eileen Butler	Executive Director, Delaware Nature Society	59
Bruce Hashinger*	Resident of Region	60
Nicholas DiPasquale	Secretary, Delaware Department of Natural Resources and Environmental Control	61
Peter Colangelo	Chair, Policy Committee, Delaware River Basin Fish and Wildlife Management Cooperative	62
Matilda Krebs	Resident of Region	63
D.W. Bennett	Executive Director, American Littoral Society	64
Anthony A. Totah, Jr.	Clean Ocean Action	65
Stephen A. O'Connor	City Administrator, Cape May County Board of Chosen Freeholders	66
James R. May ¹	Executive Director, Mid-Atlantic Environmental Law Center and Widener Environmental and Natural Resources Law Clinic	67
Maya van Rossum	Exec. Director, Delaware Riverkeeper	68
George Pavlou	Director – Division of Environmental Planning and Protection, EPA	69
Dieter Busch	Director, Interstate Fishery Management Program, Atlantic States Marine Fisheries Commission	70
Maureen Vaskis	PSEG	71
Vernon and Thelma Fisher*	Resident of Region	72
Robert Moore*	Resident of Region	73
Richard Miller*	Resident of Region	74
Roger Sedmont	No stated affiliation	75

Oral Testimony – Public Hearing at Pennsville Memorial High School (1/23/01)		
Speaker	Affiliation / Title	Commentor Number
Frank Cassidy ²	President and Chief Operating Officer, PSEG Power	71
Ruth Patrick	Curator of Limnology and Occupant of the Francis Boyer Chair at the Academy of Natural Sciences	76
Debra DiLorenzo	President, Chamber of Commerce of Southern NJ	77
Dr. Richard Horwitz ³	Senior Biologist, Academy of Natural Sciences	78

Speaker	Affiliation / Title	Commentor Number
Jim Applegate	Professor of Natural Resources at Cook College, Rutgers University	79
William Palmer	Executive Director, Water Resources Association of the Delaware River Basin	80
John Ford Evans	Attorney and Member of Salem County Chamber of Commerce	81
Charles Hessler ⁴	Business Agent, International Brotherhood of Electrical Workers, Local 94	82
Jack Kugler	Deputy Director of the Salem County Board of Chosen Freeholders	83
Roy Miller	Fisheries Program Manager, Delaware Department of Natural Resources and Environmental Control	61
Susan Ford	Research Professor, Rutgers University Institute of Marine and Coastal Sciences	84
Alan Muller	Executive Director, Green Delaware	85
Norm Cohen ⁵	Coordinator, Unplug Salem Campaign	86
Eleanor Craig	Associate Chief for the Department of Economics, University of Delaware	87
Dr. James Turke	Director, Salem County Historical Society	88
Bob Nape	Chairperson, Philadelphia Solar Energy Association	89
Dr. Joseph Shisler	President, Shisler Environmental Consultants; Management Plan Advisory Committee (MPAC) Member	90
Joseph Dyer, Sr.	Resident of NJ	91
R. Edwin Selover	Senior Vice President and General Counsel of Public Service Enterprise Group, Chief Environmental Officer of PSEG	71
Paul Williams	Unplug Salem Campaign	92
Wallace Bradway	Mayor, Lower Alloways Creek	93
Maya van Rossum	Executive Director, Delaware Riverkeeper	68
A. Totah	Clean Ocean Action	65
Jane Nogaki	Pesticide Coordinator, NJ Environmental Federation	94
Robert Cooper, Jr.	Green Action Alliance	95
John Czerwinski	Business Manager for Local 74 of the Plumbers and Pipefitters Union of Wilmington, DE	96
Richard Heffron	Sr. Vice President for the Delaware State Chamber of Commerce	97
Sharon Finlayson	No stated affiliation	98
Gina Carola	Sierra Club of NJ	99

Oral Testimony – Public Hearing at Cumberland County Community College (1/25/01)		
Person Commenting	Affiliation / Title	Commentor Number
Frank Cassidy	President /COO of PSEG Power	71
Mike Egenton	Asst. Vice Pres. of Government Relations for the NJ State Chamber of Commerce	100
Judy Hansen	Superintendent of the Cape May County Mosquito Commission	101
Marlene Asselta	President of the Southern NJ Development Council	102
Jerry Donofrio	Chairman for the Voter/Boater Coalition	103
Reverend Dr. Franklin Vilas	President of Partners for Environmental Quality	104
Bob Jackson	No stated affiliation	105
Jack Hufty	Director of Community Outreach for Salem County Vocational and Technical Schools	106

Person Commenting	Affiliation / Title	Commentor Number
Arthur Maurice	Vice Pres., NJ Business and Industry Assn.	107
Richard Kane	Vice President of NJ Audubon Society	108
Norm Cohen	Coordinator of the Unplug Salem Campaign	86
J. Frederick Grassle	Director of the Institute of Marine Coastal Sciences, Rutgers	109
George Garrison	Mayor of Commercial Township	110
Jay Laubengeyer	Assistant State Director of the Nature Conservancy of NJ and Director of Delaware Bay Shore Office	111
Lauren Riggins	Southern NJ Council of the Boy Scouts	112
R. Edwin Selover	Sr. Vice President and General Counsel of PSEG and Chief Environmental Officer	71
Dr. Miguel Cortez	Family Physician and Nuclear Physician	113
Dr. Julius Kohl	No stated affiliation	114
Maya van Rossum	Delaware Riverkeeper	68
Dery Bennett	Exec. Dir. of the American Littoral Society	64
Paul Williams	Private Citizen	93
Tony Totah	Clean Ocean Action	65
Dee (Dorothy) Singleton	Healthier Lifestyles	115
Azim Mufeed Abdulah Bey	Resident of NJ	116
Paul Carluccio	Resident of NJ	117
Tracy Carluccio	Resident of NJ and Representative of the Special Project Staff of Del. Riverkeeper	118
Belva Prycl	Board Member of EAGLE	119
Don Kirchhoffer	Project Manager for NJ Conservation Foundation	120
Marilyn Knego	Member of EAGLE and NJ Resident	121
Henry Egerton	President, EAGLE	122
Joan Egerton	Member, EAGLE	6, 11
Roger Sedmont	Resident of NJ	75
John Feltes	Former Mayor of Maurice River Twp. And Dir. of Public Works for Cumberland County	123
Roger Merle	Affiliated with the Green Party of NJ, Citizen	124
Sherman Wood	Member of International Brotherhood of Electrical Workers Local 94	125
James Brandt	Certified Organic Farmer, Private Citizen	53

Footnotes

* indicates that letters from these commentors contain similar content.

1 Submitted on behalf of American Littoral Society; Clean Ocean Action; Coalition Against Toxics; Coalition for Peace & Justice; Delaware Audubon Society; the Delaware Riverkeeper; Delaware Riverkeeper Network; Delaware Sierra Club; Green Ocean Society; NJ Environmental Federation; NJ Public Interest Research Group; NJ Sierra Club Stockton Peace Action; Surfers Environmental Alliance; Unplug Salem Alliance.

2 Testimony presented on behalf of PSEG, PECO Energy and Atlantic Energy Co.

3 Submitted on behalf of Dr Horowitz (expertise in fish), Dr. Velinsky (expertise in biogeochemistry) and Dr. Kreeger (food web processes).

4 Submitted on behalf of Chip Gerrity, President/ Business Manager.

5 Mr. Cohen also presented a petition to the public hearing officer requesting closure of the Salem Plant.

A summary of the comments submitted and the Department's responses to these comments are as follows:

Comment 1

Several commentors state that PSEG - Salem Generating Station (hereafter "Salem" or "the Station") benefits the local and regional economy. Several commentors note that the plant employs many people at good wages which positively affects the regional economy. Several commentors note that PSEG provides leadership and support to local charitable organizations and community groups. Several commentors state that the Estuary Enhancement Program (EEP) helps contribute to the tax base in the vicinity of the plant as well as to the townships in which the EEP sites are located. (Commentors 57, 58, 71, 77, 81, 82, 83, 87, 93, 96, 97, 100, 102, 106, 110, 112, 123, 125)

Response 1

While economic benefit is not a consideration relevant to the issuance of a NJPDES permit, the Department acknowledges that PSEG – Salem benefits the local and regional economy and hereby incorporates this information into the Administrative Record.

Comment 2

Several commentors note that PSEG has invested 100 million dollars to meet the permit requirements. One commentor applauds NJDEP and PSEG for the measures they have taken to reduce Salem's impacts and states that PSEG's investment has been well spent. Another commentor notes that this investment into the salt marsh restoration program is possibly the most significant investment for salt marsh restoration ever in the world. (Commentors 77, 80)

Response 2

While the size of PSEG's expenditure on the EEP is not a consideration relevant to the issuance of a NJPDES permit, the Department acknowledges that the EEP has resulted in significant expenditures and that the restoration of salt marshes is beneficial and hereby incorporates this information into the Administrative Record.

Comment 3

Many commentors state that PSEG - Salem is an important energy provider. One commentor notes that PSEG – Salem provides 2200 megawatts of generating capacity, which serves 1.5 million households. (Commentors 57, 58, 71, 77, 81, 82, 96, 97, 100, 102, 107)

Response 3

While the nature of PSEG's operation is not a consideration relevant to the issuance of a NJPDES permit, the Department recognizes that PSEG is an energy provider and hereby incorporates this information into the Administrative Record.

Comment 4

One commentor recommended that this permit renewal should be considered in the context of a power plant with no discernable end to its operational life. Each five-year NJPDES permit and its impacts on the biota of Delaware Bay are considered without the understanding that Salem could be operating with once-through cooling well into the middle of the 21st century. (Commentor 64)

Response 4

The analysis of available intake protection technologies and their associated costs and benefits considers impingement and entrainment losses until the years 2017 and 2021, which are the dates

when the nuclear operating licenses for Salem Unit 1 and unit 2 expire, respectively. The Department does not require an analysis of losses for years that extend past the expiration of the nuclear operating licenses. The permit being issued by the Department has a five-year term; if PSEG were to obtain an extension of its operating licenses for Salem, subsequent NJPDES renewal applications would be required to address such changes. The Department does not have the authority to deny or extend a nuclear operating license and therefore cannot consider losses past those dates. The authority to grant an extension of the nuclear regulatory license is under the jurisdiction of the US Nuclear Regulatory Commission.

Comment 5

One commentor states that PSEG is a major corporation using ratepayers' money to convince people that it needs no regulation. This commentor suggests that a public hearing be conducted in front of the state legislature, not just the NJDEP whose consideration is limited to strictly technical and environmental issues. Another commentor suggests that the construction of cooling towers be included as a referendum on a voter ballot. (Commentors 6, 117)

Response 5

By virtue of this and numerous other permits, PSEG has accepted the fact it is subject to regulation. PSEG has complied with all conditions of its existing NJPDES permit for the Salem Station and thus is currently in compliance status.

The permit is a product of a public process (both oral and written comments were invited) through which any New Jersey legislators were welcome to make comments. A number of elected officials requested and received information. The decision as to whether cooling towers are best technology available, must be based on law under Section 316, not public referendum.

Comment 6

Several commentors state that NJDEP should require PSEG to comply with Section 316(b) of the Clean Water Act and build cooling towers, which are best technology available. Several commentors suggest that PSEG be required to install dry-cooling. One commentor states that NJDEP has not provided the requisite legal justification for its failure to require cooling towers or dry cooling. Because cooling towers would reduce the fish kills by 95% and dry cooling could reduce the fish kills by over 99% these technologies represent "best technology available for minimizing adverse environmental impact". One commentor states that there is no reason why Salem Units 1 and 2 can not be retrofitted with cooling towers. (Commentors 6, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 29, 31, 36, 37, 38, 39, 40, 41, 43, 44, 45, 46, 47, 48, 53, 54, 55, 56, 59, 60, 63, 64, 65, 67, 68, 72, 73, 74, 75, 85, 86, 92, 94, 98, 105, 118, 119, 121, 122)

Response 6

The Department has carefully evaluated the potential application of natural draft and mechanical draft cooling towers (i.e. closed-cycle cooling systems) to the Salem plant and determined that a closed-cycle cooling system is not a best technology available (BTA) under Section 316(b) of the Clean Water Act. This evaluation process first occurred prior to the issuance of the July 20, 1994 NJPDES permit. The Department required new analysis of the costs and benefits of this technology in PSEG's March 4, 1999 application and reconsidered the issue in the December 8, 2000 draft permit. The Department has determined that closed-cycle cooling is not an available technology for Salem because the costs of retrofitting the Salem plant with this technology are wholly disproportionate to the expected environmental benefits.

Prior to issuing its July 20, 1994 NJPDES permit for this facility, the Department carefully evaluated various potential intake protection technologies and the application of these technologies within the specific circumstances of Salem. The Department then determined that the existing once-through cooling water system and associated intake structure, in conjunction with a limitation to intake flow, intake screen modifications and a sound deterrent study, constituted BTA under Section 316(b) of the Clean Water Act. In its current 316(b) rule-making for new facilities, EPA cited the suite of technologies implemented at Salem under the 1994 permit as an example of "the benefits of technologies that can be applied to maximize survival" and estimated the fishery benefits of this added technology as being \$428,000 per year [65 Fed. Reg. at 49105]. In the December 8, 2000 draft permit, the Department reevaluated various intake protection technologies and the cost-benefit information associated with those technologies, and determined that a continued intake flow limitation, continued use of the modified Ristroph intake screens which were developed pursuant to the 1994 permit, further improvements to the fish return system, and study of a multi-sensory hybrid system constituted best technology available under Section 316(b). Natural draft and mechanical draft cooling towers (i.e. closed cycle cooling) were among the technologies evaluated in the March 4, 1999 PSEG NJPDES application that were reviewed by the Department as well as the Department's contractor ESSA Technologies, Ltd. (hereafter "ESSA").

The Department agrees that a closed-cycle cooling system (i.e. cooling towers) would result in significant reductions of entrainment and impingement losses at Salem. However, the Department is legally required to take into account the costs of the technological alternative such as the retrofit of a closed-cycle cooling system, and carries the burden of proving that those costs are not wholly disproportionate to the environmental benefits. See, e.g., In re Central Hudson Gas and Electric Corporation, et al., Opinion No. 63, July 29, 1977, 1977 WL 28250, *8 (E.P.A.G.C.), In The Matter of Public Service Company Of New Hampshire, et al. (Seabrook Station, Units 1 and 2) National Pollutant Discharge Elimination System Permit, 1978 WL 21140, 1 E.A.D. 455 (E.P.A., Aug 04, 1978) (No. APPLICATION NH 00203, 76-7). As described in the July 20, 1994 permit action, the Department determined that retrofit of cooling towers would involve a complicated and wide-scale construction project involving substantial costs. The Department also determined in the July 20, 1994 permit that the evidence of record indicated that retrofitting closed-cycle cooling would result in increased air pollution and other potential adverse environmental impacts. Based on these findings, the Department was not in a position to prove that the costs of a closed-cycle cooling system were not wholly disproportionate to the expected environmental benefits.

In its March 4, 1999 application, the permittee again submitted detailed information concerning the construction costs, operation and maintenance costs and costs of replacement power involved in retrofitting closed-cycle cooling at Salem. Those costs were estimated at \$712,000,000 for a natural draft cooling tower and \$849,200,000 for a mechanical draft cooling tower. While the reductions in impingement and entrainment losses that would be achieved by retrofitting closed-cycle cooling would be substantial, the currently available abundance data of fish species occurring in Delaware Bay have not been shown to decline during the operation of Salem. Moreover, in connection with its consideration of Section 316(a) issues, the Department concluded, in both its July 20, 1994 final permit as well as its December 8, 2000 draft permit, that Salem's continued operation in accordance with the terms of this Permit should lead to the propagation of a balanced indigenous population of aquatic life. Accordingly, the Department has found that the costs of cooling towers would be wholly disproportionate to the expected environmental benefits and, therefore, cooling towers are not BTA for Salem under Section 316(b).

Retrofit of an existing once-through cooling system such as Salem with dry cooling technology would be even more cost-prohibitive than retrofit with evaporative cooling towers (i.e. natural draft or

mechanical draft cooling towers). In its March 14, 2001 comments, PSEG estimated that the costs for a dry-cooling system would be about 100% more than an equivalent wet (i.e. evaporative) cooling system. In addition, there are significant engineering and feasibility issues associated with dry cooling technology. Accordingly, there are overwhelming grounds to find that the costs of dry cooling technology would be wholly disproportionate to the expected environmental benefits and, therefore, dry cooling technology is not BTA for Salem under Section 316(b).

It is important to note that the Department is unaware of any circumstance in the nation in which an existing once-through cooling water system has been retrofitted with either an evaporative or dry cooling tower. The issue of dry cooling was raised at the recent "Technical Experts Panel for Section 316(b)" meeting on May 23, 2001; testimony from a number of participants noted that dry cooling had been installed at some relatively small combined cycle plants and was not the industry standard for large power plants. USEPA Headquarters representatives also stated that they were unaware of any circumstance in which an existing once-through cooling water system has been retrofitted with a wet or dry cooling tower technology. The absence of any known example of the retrofitting of a once-through cooling water system to a closed-cycle system is not dispositive to a BTA analysis, but it is evidential as to the actual "availability" of the implementation of such technology.

Comment 7

Several commentors suggest that cooling towers would contribute to economic growth and employment. One commentor states that the installation of a closed-cycle cooling system would benefit the commercial fishing industry, the sport fishing industry and the tourist industry of South Jersey and Delaware whereas the EEP only benefits a few landowners and does not provide many jobs to the area. (Commentors 11, 65, 75, 86, 94, 105)

Response 7

Response 6 details the legal reasons why the Department cannot require cooling towers. The argument that cooling towers would spur economic development cannot supplant the required legal analysis. As part of the detailed cost-benefit analysis that was performed for a retrofit of the Salem Station with natural draft and mechanical draft cooling towers, decreased mortalities, as well as any resulting benefits to the commercial and sport fishery, were considered. Therefore, some of the local economic factors have been taken into account. Benefits of the EEP are discussed in Comment 33 and Comment 34.

Comment 8

One commentor suggests that PSEG has been on notice for thirty years (since enactment of Section 316(b) of the Clean Water Act in 1972) that a design change, reduced capacity, or some other technology, may in the future be required and that PSEG should be held responsible for technologies that were achievable at the time of construction or were foreseeable. One commentor states that cooling towers have been the industry standard since 1972. Some commentors state that if a new nuclear power plant were to be built today on Delaware Bay, it would be required to have cooling towers. One commentor notes that EPA contends that the reference point for BTA is cooling towers. (Commentors 64, 65, 67, 68, 85)

Response 8

The detailed planning process for design and construction of Salem Units 1 and 2 began in 1968 whereas construction of Salem began in 1970. As part of the licensing process, federal and state agencies charged with protecting the aquatic resources reviewed the current design. These dates predate the Clean Water Act.

The Department does not agree that the 1972 Clean Water Act unequivocally mandates the construction of cooling towers. To illustrate this point, please refer to Table 14 entitled "Estimated Cumulative Distribution of Cooling Water System Configurations as a Function of Age for Traditional Utilities and Non-utility Power Producers." This table was distributed at the May 23, 2001 "EPA Technical Experts Panel for Section 316(b)" as described above in Response 6 and is included as Attachment 1. As indicated in this table, many facilities have been constructed with once-through cooling water systems after the 1972 Clean Water Act was enacted.

USEPA Headquarters recently issued proposed rules for Section 316(b) for new facilities. [65 Fed. Reg. at 49105]. This draft proposal states that EPA is not firmly committed to the format of the proposal and invites comment as to other approaches. Even so, these proposed rules do not unequivocally state that best technology available is cooling towers. Therefore, the Department does not necessarily agree it has the authority to require that any new facilities would be required to be constructed with cooling towers.

Comment 9

Numerous commentors state that NJDEP is allowing PSEG to engage in experimentation, mitigation and other programs that do nothing to reduce the fish kills but have become an integral part of the company's marketing plan. One commentor states that no amount of strobe lights, sound deterrents, experimental marsh building, fish ladders and scientific studies deal with the problems of once-through cooling. Some commentors state that the wetlands mitigation experiment, fish ladders and bay-wide monitoring program are not technologies applicable to the cooling water intake structure and therefore do not fulfill the requirements of Section 316(b). One commentor requests that NJDEP not allow any more experiments that do not represent proven technology at the intake structure. Some commentors state that the EEP should not be accepted as a trade-off for cooling towers. (Commentors 36, 37, 38, 39, 40, 41, 44, 45, 46, 47, 48, 64, 65, 68, 86, 98, 99, 119)

Response 9

The Department did not designate the wetlands restoration program and fish ladder requirements as best technology available under Section 316(b) nor have these requirements been required in lieu of cooling towers. The Department incorporated this plan, after it was voluntarily proposed by PSEG outside of what was required under Section 316(b), as a special condition to the permit because of its environmental benefits and because it will continue to help minimize the potential for adverse impact from the cooling water intake structure even after the useful life of the plant has expired. PSEG established the EEP to implement these requirements as well as other permit requirements. Moreover, it should be noted that USEPA has issued other permit decisions that have required mitigation measures. See, e.g., In the Matter of Crystal River Power Plant Units 1, 2 and 3 (Florida Power Corporation), NPDES Permit No. FL00000159 (revised Findings and Tentative Determinations Pursuant to 33 U.S.C. Section 1326, September 1, 1988) (hereafter "Crystal River Determination") and Tennessee Valley Authority (John Sevier Steam Plant) NPDES No. TN0005436 (USEPA 1986). In Crystal River, the USEPA determined that the costs of retrofitting the Crystal River Power Plant with closed cycle cooling were wholly disproportionate to the environmental benefits to be gained and, further, that construction of a fish hatchery, which was proposed by the permittee, would help minimize the environmental impacts of the cooling water intake structure and should be included in the plant's permit. In the John Sevier matter, EPA required a continuous fish stocking program among other requirements after finding that the costs of removal of a detention dam would be wholly disproportionate to the environmental benefits to be conferred.

The Department has determined that strobe lights and sound deterrent technologies have merit and are potentially applicable at Salem. The Department has also determined that these are potentially

available technologies at a cost that is not wholly disproportionate to the environmental benefits. The Department does not agree that these technologies are experimental in nature. These technologies have proven effective at other sites where this effectiveness is largely dependent on many site-specific factors. However, it would not be prudent to install deterrent technologies at Salem until the effects of these technologies in Salem's environment are better understood through the studies required in this permit.

Comment 10

Several commentors note that the flow limit included in the permit reflects no actual flow reduction. One commentor states that based on this fact, the design of Salem's intake structure does not reflect BTA. (Commentors 65, 67, 68)

Response 10

The flow limitation contained in the Permit is not a reduction in actual flows but a restriction. The December 8, 2000 draft permit retains the monthly average intake flow of 3024 million gallons per day (MGD) as included in the July 20, 1994 permit. This flow, which is the historical average intake flow that has occurred during Salem's operation, is less than the pump design capacity of 3197 MGD. The permittee, by accepting the proposed limitation, is foregoing the opportunity to increase average intake flow should future conditions, such as an increase in demand for or the price of electricity, justify greater maintenance expenditures to allow pumps to operate at their rated capacity for substantial periods. By the same token, the flow restriction prevents any increases in impingement and entrainment mortality that would result from increasing intake flows above the current levels.

As stated in Response 6, the Department has determined that the existing once-through cooling water intake structure in conjunction with an intake flow limit, continued use of the modified Ristroph intake screens, further improvements to the fish return system and study of a multi-sensory hybrid system constitutes BTA for Salem.

Comment 11

One commentor states that the capacity of Salem's intake structure does not reflect BTA. This is based on the fact that the flow limit in the 2000 draft permit represents no flow reduction. One commentor states that it is reasonable to equate capacity with volume although it is not appropriate to redefine "capacity" as the intake velocity. Minimization of capacity would result in a minimization of entrainment impacts. (Commentor 67)

Response 11

Please see Response 10 above regarding the basis for the intake flow restriction.

The permittee, by accepting the limitation, is foregoing the opportunity to increase average intake flow should future conditions, such as an increase in the price of electricity, justify greater maintenance expenditures to allow pumps to operate at their rated capacity for substantial periods. Moreover, this limit restricts operation of the Station to the levels that PSEG used in the impact assessment upon which the Department used in making its permit determination in 1994 and 2001.

The Department agrees that a reduction in intake flow could potentially result in lesser entrainment impacts; however, this would be dependent on many factors, including the magnitude of the flow reduction. A reduced intake flow could also result in higher effluent temperatures in excess of what is already limited in the NJPDES permit. Higher effluent temperature could have impacts on the balanced indigenous population and would therefore warrant evaluation and a new Section 316(a) demonstration. Therefore, there are both positive and negative implications of a reduced intake flow.

Please refer to [Response 123](#) for specific discussion regarding revised refueling outages (i.e. seasonal outages) which is an intake protection technology that results in significant flow reductions.

Comment 12

One commentor states that the location of Salem's intake structure does not reflect BTA. USEPA stresses that intake structures should be located so as to avoid highly productive biological areas and estuarine environments. (Commentor 67)

Response 12

The Department agrees that Salem is located in an estuarine environment and that such an environment is a highly productive biological area. Existing USEPA guidance, however, does not prohibit the location of intake structures in estuaries. The Department considered the impingement and entrainment losses (which losses are indicative of an estuarine environment) at Salem in evaluating various intake protection technologies for its BTA determination. As stated in [Response 6](#), the Department evaluated the efficacy of various intake protection technologies as well as the costs and benefits of those technology in applying Section 316(b) of the Clean Water Act.

Comment 13

One commentor states that the Salem Station is located on the worst part of the river for a once-through cooling system with its seasonal high detritus loads and abundant aquatic life. Keeping the intake screens on high-speed continuous clean mode during late winter and early spring can lead to premature screen failure. The money spent on screen repairs during the past twenty years could have paid for alternative cooling methods by now. (Commentor 60)

Response 13

The Department agrees that Salem is located in an estuarine environment that is subject to high detrital loads, particularly in the spring. The commentor does not provide any information on the cumulative cost of screen repairs. However, there is no specific information in the Administrative Record on the costs associated with screen maintenance during periods of high detrital loading to provide a basis for the claim that these costs are greater than the cooling tower alternative. Because the improved screens have already been implemented, Section 316(b) does not require the Department to reevaluate the operating costs of implementing this alternative. Moreover, the Department determined in its July 20, 1994 permit decision that improvements to the intake screens and subsequent operation and maintenance of those screens were an available technology for which the costs were not disproportionate to the benefits. As stated in [Response 6](#), the costs associated with retrofitting Salem with a closed-cycle cooling system are estimated to be \$712,000,000 for a natural draft cooling tower and \$849,200,000 for a mechanical draft cooling tower. The operation and maintenance costs of the current intake screens over the past 20 years are likely to have been significantly less than this amount.

Comment 14

One commentor states that the NJPDES permit needs to specify a close down date for PSEG. If not, the operating life of the power plant can be extended 50 years or more with upgrades, retrofits and new technology that has not even been invented. (Commentor 65)

Response 14

As stated in [Response 4](#), the Department does not have the authority to deny or extend a nuclear operating license. As such, the Department can not specify a shut down date for Salem.

Comment 15

One commentor indicated that NJDEP should delay issuance of a final permit for Salem until it has had the benefit of new and emerging information from EPA Headquarters concerning Section 316 specific to the impacts of existing facilities. This information is expected by the end of the year. In addition, EPA is convening a panel of technical experts to review information on cooling water intake technologies. (Commentor 68)

Response 15

The Department is well aware that EPA Headquarters is in the process of developing rules for existing facilities for Section 316(b); however, it would not be appropriate for the Department to delay the issuance of the renewal permit until EPA's rule-making process is completed. The Department is an active participant in this rule-making process and Department representatives attended the EPA "Technical Experts Panel for Section 316(b)" where New Jersey was invited to be represented on the panel. Rule-making for Section 316(b) for existing facilities is scheduled for issuance in February 2002 in draft form. The Administrative Record for this permit as well as EPA draft guidance provides sufficient information for the Department to rely in making a reasoned decision.

The Department looks forward to the issuance of rules for new and existing facilities for Section 316(b). However, the Department has been waiting for EPA guidance for more than two decades. In the meantime it is important for the Department to implement Section 316(b) in NJPDES permits by applying the existing draft guidance and legal precedent as carefully as possible to expeditiously require installation of technologies such as modified intake screens and restricted flow. Had the Department taken this commentor's view the Delaware Estuary would not have benefited from any of these technologies over the past seven years.

In the event that rules from EPA Headquarters are issued in final form and those rules warrant different permit conditions than those specified in PSEG-Salem's NJPDES permit, the Department has the right to reopen Salem's permit and impose alternate permit conditions as specified in the reopener clause included in Part IV of the permit.

Comment 16

One commentor states that closed-cycle cooling systems are best technology available as they avoid or minimize adverse environmental impacts. However, based on site-specific parameters such as the life expectancy of the Station, the costs associated with retrofitting and the minimization and compensation measures already implemented by PSEG, it may be prudent to concentrate on measures that fully minimize and adequately mitigate for adverse effects within the parameters of the existing plant structure. This assumes that Unit 1 will not operate after 2017 and Unit 2 will not operate after 2021. (Commentor 1)

Response 16

The Department agrees that cooling towers can minimize impingement/entrainment effects by requiring less flow than a once-through cooling system. However, as stated in Response 6, the Department does not agree that a closed-cycle cooling system is BTA for the Salem Station.

The Department also agrees that site-specific parameters are relevant in making its cost-benefit determination in defining best technology available. The Department considered these site-specific parameters in making its Section 316(b) determination. The commentor is correct that the Department's decision-making assumed close-down dates of 2017 and 2021 because, as stated in

Response 4, the Department does not have the authority to authorize an extension of a close-down date for Salem.

Comment 17

Two commentors indicate that the proposed draft permit impermissibly considers costs in rejecting true BTA at Salem. In light of the Supreme Court decision *Whitman v. American Trucking*, it is improper for the Department to consider the costs of BTA at all in making a BTA determination. If Congress intended economics to be a factor in determining BTA, it would have specifically worded the statute to do so; NJDEP may not engraft such considerations at Salem. Another commentor states that the federal mandate is for BTA without consideration of costs. (Commentor 67, 75)

Response 17

The Department disagrees that costs are not a consideration in determining BTA under Section 316(b). The court in *Seacoast Anti-Pollution League v. Costle*, 597 F.2d 306 (1st Cir. 1979) recognized the appropriateness of considering costs in a Section 316(b) determination and stated:

Petitioners, wisely, do not argue that the cost may not be considered [under Section 316(b)], and no harm is done by noting that there would be other costs. The legislative history clearly makes cost an acceptable consideration in determining whether the intake design "reflect[s] the best technology available." footnote omitted.

Congress clearly intended that Section 316(b) determinations included cost considerations. See A Legislative History of the Water Pollution Control Act Amendments of 1972, reprinted by Congressional Research Service ("Leg Hist."). In this regard, one of the sponsors of the bill stated that "best technology available" includes a consideration of "economically practicable cost." Leg. Hist. at 264.

Based on the legislative history, USEPA and state agencies have consistently rejected technologies as BTA if the costs are wholly disproportionate to the expected environmental benefits. In the *Seabrook* decision, the USEPA Administrator ruled that technology-based requirements would not be required as "best technology available" under Section 316(b) when their cost was "wholly disproportionate" to environmental benefit. The Administrator stated that "it is not reasonable to interpret Section 316(b) as requiring [the] use of technology whose cost is wholly disproportionate to the environmental benefit to be gained." *Public Service Co. of New Hampshire* (Seabrook Station Units 1 and 2), Case No. 76-6 (USEPA 1977). The "wholly disproportionate" standard, which was upheld by the court in *Seacoast Anti-Pollution League*, implements Congress' intent that costs be weighed against benefits in determining BTA under Section 316(b).

The case cited by the commentor, *Whitman v. American Trucking*, is not instructive as to the above discussion of Section 316(b) of the Clean Water Act, but relates to the setting of National Ambient Air Quality Standards (NAAQS) pursuant to Section 109(d) of the Clean Air Act (CAA). *Whitman* affirms a long line of cases that hold that in the specific context of NAAQS, which are entirely health-based, that "economic considerations [may] play no part in the promulgation of ambient air quality standards under Section 109" of the CAA. *Whitman v. American Trucking*, 121 S.Ct. 903, 909, 531 U.S. 457, 149 L.Ed.2d 1 (2001), citing, *Lead Industries Assn., Inc. v. EPA*, 647 F.2d 1130, 1148 (C.A.D.C.1980), *American Lung Assn. v. EPA*, 134 F.3d 388, 389 (C.A.D.C.1998); *NRDC v. Administrator, EPA*, 902 F.2d 962, 973 (C.A.D.C.1990), vacated in part on other grounds, *NRDC v. EPA*, 921 F.2d 326 (C.A.D.C.1991); *American Petroleum Institute v. Costle*, 665 F.2d 1176, 1185 (C.A.D.C.1981).

Comment 18

The permit should have assessed the marginal increase in costs to ratepayers for requiring BTA. Applying the correct cost methodology for closed-cycle cooling, the maximum rate increase to PSEG's ratepayers would be about \$1.00 per month per ratepayer with an average bill of \$100.00 per month as estimated by several commentors. Another commentor estimates that the cost of cooling towers at \$11 per year per ratepayer. One commentor cites legal precedent for this position in Appalachian Power Co. v. Train, E.I. DuPont DeNemours & Co. v. Train and Seabrook II. Another commentor states that if natural draft towers are installed at Salem, given the costs and financial characteristics that are contained in the permit application, a PSEG ratepayer could expect to see an electric increase of 1.1% monthly or about \$13.20 annually. Applying a marginal cost increase test here would have established that the cost of closed cycle cooling is not wholly disproportionate to the environmental benefits. (Commentors 65, 67, 68, 75)

Response 18

The Department did not require the permittee to quantify costs in terms of the marginal increase in costs to ratepayers. This is based on the fact that the Department does not agree that regulatory guidance directs permittee to do such as part of a Section 316(b) cost/benefit analysis. Although EPA decisions have required the application of the "wholly disproportionate" test within a 316(b) analysis, those same EPA decisions have also found that Section 316(b) does not contemplate formal cost/benefit analysis. See, Decision of the General Counsel, No. 63, July 29, 1977 at p. 382. Rather, decisions under Section 316(b) concerning BTA for cooling water intake structures require a case-by-case determination and should include an evaluation of economic considerations. BTA is intended to mean the best technology available commercially at an economically practicable cost and, further, that the costs of a technology must not be wholly disproportionate to the environmental benefits to be gained. See, In the Matter of Carolina Power and Light Company (Brunswick Steam Electric Plant), NPDES Permit No. NC0007064 (November 7, 1977) at 31-32; In the Matter of Public Service Co. of New Hampshire (Seabrook Station), Case No. 76-7 (June 10, 1977)(Seabrook II) at 13; Letter dated January 14, 1991 from Cynthia C. Dougherty, Director, Permits Division, US EPA to John Fields, NJDEPE.

Seabrook II specifically dismisses the cost/benefit analyses contemplated in DuPont and Appalachian Power, finding that the omission of an express statutory mandate to consider costs in Section 316(b) distinguishes this section from CWA Sections 301 and 304. While there is nothing in Section 316(b) indicating that a formal cost/benefit analysis should be done, some consideration ought to be given to costs in determining the degree of minimization to be required so as to avoid the requirement of a "technology whose cost is wholly disproportionate to the environmental benefit to be gained." Seabrook II, at 13. Accordingly, as no formal cost/benefit is required, there are no specific requirements as to the quantification of retrofit costs in terms of the marginal increase to ratepayers. Consideration of costs in a generalized context is a particularly reasonable approach, given that the costs considered in a 316(b) analysis also include environmental and societal costs such as negative air quality effects, which would be difficult, if not impossible, to quantify on a ratepayer basis.

Comment 19

Some commentors state that by disregarding societal costs and benefits, NJDEP misapplies the cost/benefit test. PSEG's cost-benefit analysis is inadequate because it understates the active component of the environment and does not address the passive component of the environment. The active component consists of actual use of the Delaware Estuary recreation whereas the passive component consists of two parts, option and existence values. Option values refer to an increase in use as conditions change and existence values refer to the amount that individuals are willing to pay to preserve the estuary out of a sense of responsibility. Therefore, PSEG's flawed analyses has

devalued the benefit of alternate technologies such as closed-cycle cooling. Some commentors note that ESSA found PSEG's cost-benefit assessment to be skewed to primarily reflect costs but not give a proportionate share of benefits, particularly to societal benefits. This commentor further notes that the cost-benefit analysis should not provide a basis for regulatory decision-making until these errors have been addressed. Some commentors state that the costs and benefits of fish protection in PSEG's analysis needs to be re-evaluated in light of the appropriateness of only counting caught fish; ignoring changes in estuary use if the ecosystem improves; and ignoring stewardship values. One commentor states that an inappropriate discount rate was used to value environmental resources. (Commentors 67, 68,119)

Response 19

The Department does not agree that PSEG did not include societal costs and benefits. The social cost estimates presented in the cost/benefit analysis of fish protection alternatives were based upon the concept of social cost. The cost components included in the cost/benefit assessment include:

- construction costs - the capital costs required to implement alternatives;
- operation and maintenance costs - the annual operations and maintenance costs to implement alternatives;
- value of lost energy - the annual value of "lost energy" from implementing alternatives. Lost energy is the reduction in energy generation from Salem as a result of fish protection alternatives. The value of lost energy is the estimated net cost of replacing that energy using alternate generating capacity;
- value of lost capacity - the annual value of "lost capacity" from implementing alternatives. Lost capacity is the reduction in available power generation capacity as a result of fish protection alternatives. The value of lost capacity is the estimated cost of replacing the capacity;
- value of changes in air emissions - the annual value of changes in air emissions from implementing alternatives.

PSEG presented societal benefit estimates based upon the effects of fish protection alternatives on the stocks of individual fish species, including finfish and macroinvertebrate species. These estimates are based on the following two components of benefits:

- commercial fishing benefits - benefits resulting from increases in commercial catch due to fish protection alternatives.
- recreational fishing benefits - benefits to recreational anglers from increases in recreational catch due to fish protection alternatives.

While ESSA requested substantial additional information to corroborate assumptions in PSEG's application, ESSA did not raise fundamental challenges to the data, methods or conclusions in PSEG's application. The commentors have provided no information to support a claim that significant categories of costs or benefits were omitted from the PSEG cost-benefit analysis.

As noted in Response 18 above, Section 316(b) does not require a formal or detailed cost/benefit analysis, but a generalized consideration of costs in determining the degree of minimization to be required so as to avoid expenditures which are "wholly disproportionate" to the benefits to be gained. Additionally, there exists no EPA guidance as to the particulars required in a 316(b) consideration of costs. In this context, the Department determined that the cost/benefit analysis provided in the March 4, 1999 NJPDES application was technically adequate and provides a sufficient basis for the Department's permit decision.

The 1983 USEPA Cost-Benefit Guidelines address the issue of estimating benefits from regulatory requirements that affect ecosystems whereas the most recent EPA Guidelines do not provide specific

recommendations for estimating benefits to ecosystems under different environmental conditions. In cases in which the ecosystem is not in jeopardy, the 1983 USEPA Cost-Benefit Guidelines identify two components of ecosystem benefits: (1) benefits from changes in commercial species and (2) benefits from changes in recreational species. Although these guidelines mention the possibility of other values for species that do not have recreational or commercial value, no specific valuation methods are identified. PSEG developed values for commercial and recreational species affected by the alternatives at Salem. In addition, PSEG developed values for the forage species based upon the recreational and commercial values of the additional predator species that would be made available after consumption of those forage fish. The Application describes the methodology for converting gains in these forage species to gains in species with recreational and commercial values (Application Appendix F, Section III.B.). In summary, the Department has determined that PSEG's cost-benefit analysis considers the relevant benefits categories. The benefits estimates calculated therefore are sufficient for the Department to render its permit decision.

Regarding the discount rates used on PSEG's March 4, 1999 application, the Department has determined that the discount rate used in PSEG's March 4, 1999 application (6.9% and sensitivity analyses using 3 and 9%) are consistent with EPA and Office of Management and Budget (OMB) 1996 guidelines. Use of the lower discount rate as suggested by this commentor would not materially change the cost-benefit ratios.

OMB recommends use of a rate of 7 percent, with sensitivity analysis performed with rates of 4 and 10 percent. The most recent EPA guidelines recommend using both a two to three percent rate and the rates based on OMB's guidance. PSEG compared the cost-benefit results using all three rates (6.10 percent, 3 percent, and 9 percent.). Use of the 3 percent discount rate as suggested by this commentator did not materially change the cost-benefit ratios.

Comment 20

Two commentors indicate that retrofitting with cooling towers would not be an economic burden to PSEG. When Salem was shut down for upgrades and retrofit, PSEG posted positive earnings five out of eight quarters. The costs of the retrofit were passed to their customers with no noticeable increase in their utility bills. (Commentors 65, 119)

Response 20

Overall corporate revenues are irrelevant to the Department's consideration, as revenues from Salem are just one part of PSEG's earnings as a corporation. Whether or not inclusion of a technology would jeopardize the economic viability of the Salem plant or the entirety of PSEG is not the appropriate test for the inclusion of alternate intake protection technologies in a 316(b) determination. Rather, the Department must determine that the costs of an alternate intake protection technology are not wholly disproportionate to the environmental benefits in applying Section 316(b). As described in Response 6 above, the Department has determined that the costs of retrofitting the Salem Station with cooling towers are wholly disproportionate to the environmental benefits, for the purposes of compliance with Section 316(b). Please refer to Response 18 regarding costs to the ratepayer and to Responses 18 and 19 regarding methodology for consideration of costs.

Comment 21

Several commentors note that PSEG could have amortized cooling towers over 30 years so they would not have been too expensive. All the money and effort spent on the EEP could have been directed towards cooling towers. Another commentor states that the implicit assumption about the remaining useful life at Salem made by PSEG in its cost/benefit analysis should be tested to see if it

alters the result of the cost/benefit analysis relied upon by the Department in issuing a permit. (Commentors 64, 68, 86, 105)

Response 21

There is no legal precedent or factual basis upon which to penalize a facility for a perceived lack of foresight by amortizing the costs of a technology back to a time in the past when such technology was not required. The cost/benefit analysis included in the March 4, 1999 NJPDES application appropriately amortized the costs of additional technologies based on an assumption that Unit 1 will cease operation in 2017 and Unit 2 will cease operation in 2021, the dates on which the operating licenses for these units are scheduled to expire. In the event PSEG were to seek an extension of its operating license, the Department would reconsider the cost-benefit analysis. There is no basis at this time to require PSEG to conduct an analysis for dates beyond the expiration of the nuclear operating license. As described in Response 4 above, the Department does not have the authority to extend an operating license and therefore cannot require the cost/benefit analysis to include a greater period of time such as thirty years.

Comment 22

Several commentors state that there is a value to the marine life being destroyed at Salem, which results in a great loss to the fishery. One commentor states that if 3 billion fish are killed at the intake structure and if 50% are saved by the intake screens, then this equates to a 1.5 billion dollar loss to the fishery if it is assumed that the fish are worth a dollar a pound. Another commentor states that the value to the marine life destroyed at the plant includes a commercial value to the fishery, a value to lost ecotourism and a value as a lost food source. (Commentors 64, 99, 105, 122)

Response 22

The Department agrees that there's a value to the marine life being impacted at the plant. However, these losses are taken into account in the cost/benefit analysis described previously in Responses 6 and 19. Specifically, if technologies can reduce or eliminate losses, the economic value of the fish saved is included in the cost/benefit evaluation of that technology. The benefits analysis, that was part of the cost/benefit evaluation of technology alternatives included in the March 4, 1999 application, did consider the value of both commercial and recreational species of fish lost to entrainment and impingement. In addition, the value of lost forage organisms (which are not targets of commercial or recreational fishing) was taken into account by considering their lost contribution as food to predator fish, loss of growth by the fish that eat the forage, and subsequent reduction in the harvest of the predator fish by the commercial and recreational species. These benefits are then compared to the costs of the technology to determine the cost/benefit ratios for the various intake protection technologies. Again, it is important to note that the permitting authority carries the burden of proving that the costs of a required technology are not wholly disproportionate to the environmental benefits.

Comment 23

Several commentors state that the EEP is a reasonable alternative to the cooling towers that were originally proposed for the Salem Plant. One commentor states that although it is troubled that the Salem units were able to be constructed without cooling towers, the EEP is a positive response in trying to compensate for the ecological damage caused by the Salem units. Another commentor states that new cooling towers would have functioned for a limited number of years whereas the life of the restored wetland will be infinite. Another commentor states that although it recognizes cooling towers are probably BTA, such an investment is not going to happen today if it did not happen in 1994. Therefore, an alternate means to provide protection for fish and other aquatic life in the estuarine system is in order. (Commentors 7, 22, 23, 66, 71)

Response 23

The Department acknowledges these positive comments regarding the EEP and hereby incorporates this information into the Administrative Record. As noted in Response 9, the EEP was not designated by the Department as part of the BTA determination nor was the EEP required in lieu of cooling towers.

Comment 24

Several commentors state that the EEP is a sensible compromise. Commentor 21 states that the proposed permit sufficiently addresses important fisheries issues while also helping to ensure the long-term protection of the ecology of the Delaware Estuary. Commentor 42 notes that the conditions of the draft permit offer a solution that is a workable balance between the environment and the economy. Commentor 42 further states that it encourages and supports efforts such as the EEP that seek and encourage solutions, not rhetoric. Commentor 32 expresses support for the EEP and believes that State Managers made the right decision. Commentor 71 states that the permit represents a well-reasoned and balanced decision that is based on an exhaustive body of evidence. Commentor 9 states that the wisdom of the last permit decision has been documented by the studies conducted and that best technology available was used. Commentor 76 expresses support for this permit as it is an innovative, progressive approach to solving a complex environmental issue. The permit renewal will allow continuation of the innovative public policy decision included in the 1994 permit. Commentors 71 and 81 state that the EEP is an innovative public policy decision. Commentor 91 states that the EEP is a fine example of cooperation between industry and its neighbors. (Commentors 9, 21, 32, 42, 76, 81, 91)

Response 24

The Department acknowledges these positive comments supporting the EEP and NJPDES permit actions and hereby incorporates this information into the Administrative Record.

Comment 25

Many commentors express support for the EEP, given its lasting impact on the ecosystem, and make specific note of the magnitude of acreage included in the EEP. One commentor states that the creation and improvement of healthy and thriving wetlands and uplands are very worthwhile undertakings for the continued protection of the fish population. Several commentors state that the EEP is a model for other NJPDES permits. Some commentors state that those who drafted the 1994 permit conditions were thinking about the well-being of the entire estuary and that the proposed permit represents bold thinking in resource management. One commentor states that the effects of the Station will be short-lived as compared to the permanent protection of the Delaware Bay environment by the renewed permit conditions. Another commentor states that the restoration sites and adjoining uplands are protected by law and will continue to benefit fish and wildlife and be enjoyed by people long after the generating station is retired. One commentor states that the EEP is a showpiece of environmental sensitivity and practicality and a bright example for the nation. (Commentors 3, 4, 7, 22, 27, 34, 42, 49, 57, 71, 79, 81, 104, 111, 120)

Response 25

The Department acknowledges these supportive comments regarding the EEP and hereby incorporates this information into the Administrative Record.

Comment 26

Many commentors express support for the EEP given the importance of wetlands to the Delaware Bay ecosystem. One commentor states that the restoration of wetlands is an alternative that allows the ecosystem (not man) to make the decision on what aquatic life to produce. Another commentor

expresses support for restoring wetland marshes and emphasizes the importance of estuaries to preserving biological life, contributing to the cleanliness of the ocean, and as nursery grounds for many estuarine and oceanic species. One commentor states that the EEP is the largest wetland restoration and stresses the importance of wetlands for fish production since wetlands serve as nursery habitat, spawning grounds, a source of nutrients and as a shelter from predators. Another commentor notes that the creation of new nursery areas in marshland will augment the losses at Salem. One commentor states that the EEP has successfully reversed ecologically degraded conditions at the EEP sites resulting in improved environmental conditions in the bay. Another commentor states that the preservation of large continuous tracts of bayshore marshland is a major long-term conservation action for an ecologically significant area. (Commentors 5, 9, 42, 71, 76, 78, 80, 104, 109)

Response 26

The Department acknowledges these supportive comments on the ecological value of the EEP and hereby incorporates this information into the Administrative Record.

Comment 27

Many commentors state that the EEP provides research benefits. Several commentors recognize the advancements in science and understanding of marsh ecology as a result of the EEP; the EEP has proven that coastal wetlands can be restored on a large scale basis. One commentor states that it is one of the most important projects in the nation due to the severely degraded conditions of the lands restored as well as the large scale of the ecosystem. Another commentor states that through its work in the EEP, PSEG has advanced the science of marsh studies and their conservation that will benefit others to further scientific knowledge of salt marsh restoration. One commentor states that the wetland restoration program with its successes and failures, can instruct those who want to move ahead with wetland improvements in other places in NJ. Another commentor expresses appreciation for the research reports and definitive studies that have resulted from the EEP. The EEP teaches us how to work with nature on such restoration projects. This information will serve the entire world in the decades to come. One commentor states that research and monitoring funded through the EEP has resulted in new and improved insights into marsh function and structure that can be applied throughout the nation. This commentor further notes that the EEP is serving as a model to other major wetland initiatives through a scientific workshop. (Commentors 3, 5, 22, 30, 34, 49, 52, 71, 76, 78, 80, 90, 109)

Response 27

The Department concurs with these comments regarding research benefits associated with the EEP and hereby incorporates this information into the Administrative Record.

Comment 28

Several commentors indicate that PSEG is acting in good faith with respect to the EEP and/or other permit conditions. Several commentors note the outstanding effort PSEG has expended with respect to the EEP. Several commentors commend PSEG for the scientific expertise employed. Another commentor compliments the company and the EEP staff. Their demeanor, sincerity and willingness to be involved and helpful has positively impressed those who have worked closely with the staff. Several commentors, all of whom live in or are affiliated with townships that contain EEP sites, express gratitude for the EEP and for their good relationships with PSEG. One commentor commends PSEG for being beneficial stewards of the land. Another commentor states that PSEG kept its promises from 1994 to improve the Delaware Estuary and the citizenry who live, work and recreate here. (Commentors 4, 21, 22, 23, 28, 30, 32, 76, 80, 82, 84, 93, 96, 97, 101, 109, 110, 123)

Response 28

The Department acknowledges these supportive comments regarding the EEP and hereby incorporates this information into the Administrative Record.

Comment 29

Several commentors indicate that the EEP provides benefits to fish and wildlife. One commentor states that he has witnessed increased wildlife in Lower Alloways Creek as a result of the EEP. Another commentor notes that marsh productivity at the formerly diked salt hay farms has increased so that there are more fish, crabs, vertebrates, invertebrates, waterfowl and other wildlife. In addition, the installation of fish ladders and the enhancement of degraded wetlands are extremely important to the annual lifecycle needs of shellfish, fish and wildlife. Several commentors note that the benefits are enormous and are already proving effective; some of the estuary sites are now host to some of the largest concentrations of waterfowl in NJ. Another commentor states that the systems that are part of the EEP sites are functioning based on his inventory of birds and other mammals. (Commentors 5, 8, 21, 78, 93, 101, 123)

Response 29

The Department concurs with these positive comments regarding the ecological value of the EEP to fish, shellfish, birds and other wildlife and hereby incorporates this information into the Administrative Record.

Comment 30

Numerous commentors note that the EEP provides benefits to the estuary. One commentor states that the EEP is a substantial action that greatly enhances and improves estuarine life in Cumberland and Salem Counties. One commentor states that the EEP is providing immeasurable benefits to the quality of fish and wildlife habitat of the Delaware Estuary. Another commentor states that based on his observations the Maurice River Township (MRT) site is incurring supreme success in terms of juvenile fish, food and shellfish replenishment. Another commentor states that the natural areas being restored are providing habitat for hundreds of species from fish to song birds, to raptors and waterfowl, while providing access to the estuary for New Jersey and Delaware citizens of today and in the future. Salt marsh restoration was the least expensive option with the least long term maintenance but the widest possible ecological benefits. One commentor states that restoring tidal marshes to a productive state is obviously beneficial. (Commentors 1, 9, 21, 23, 24, 32, 34, 61, 79, 80, 82, 84, 91, 93, 100, 123)

Response 30

The Department concurs that the EEP provides benefits to the estuary and hereby incorporates this information into the Administrative Record.

Comment 31

Several commentors indicate that the fish ladders are a success and are benefitting the herring populations. One commentor states that the construction of a fish ladder in Bridgeton restores a historic fishery and improves the overall quality of life. Another commentor states that the eight fish ladders have opened approximately 700 acres of impoundments and greater than 100 miles of streams as aquatic habitat. Another commentor supports installation of additional fish ladders to further minimize entrainment and impingement effects from Salem. (Commentors 1, 3, 24, 34, 71, 78, 80)

Response 31

The Department concurs that the installation of fish ladders and the restoration of herring runs are of ecological value to the estuary and hereby incorporates this information into the Administrative Record. It is important to note that in its December 8, 2000 draft permit, the Department determined that PSEG fully complied with the permit condition requiring installation of fish ladders and other associated fish ladder requirements. PSEG has completed installation of eight fish ladders. Five fish ladders were installed under the terms of the NJPDES permit and three were installed under the terms of the 1995 Delaware Department of Natural Resources and Environmental Control (DNREC) Settlement. In response to comments from the United States Fish and Wildlife Service ("USFWS"), PSEG has voluntarily offered to install up to two additional fish ladders in New Jersey; the Department has included language in the final permit to address PSEG's commitment as item G.4.b. in the final permit.

Comment 32

The fish ladders have passed very few fish. (Commentor 65)

Response 32

The Department does not agree. While some fish ladders have provided passage for more fish than others, the fish ladders have already passed a significant number of fish based on biological sampling performed in 1996 through 2000. The following table is a summary of the 2000 river herring adult passage data for the eight fish ladder sites as well as the dates of installation:

<u>Fish Ladder</u>	<u>Date of Installation</u>	<u>Number of Fish Passed</u>	<u>Number of Sampling Hours</u>
Cooper River Lake	Spring 1998	4	596
Sunset Lake	Spring 1997	30	1957
Silver Lake	Spring 1996	92	2093
McGinnis Pond	Spring 1996	40	2126
Coursey's Pond	Spring 1997	850	1961
McColley Pond	Spring 1996	1269	1962
Garrisons Lake	Spring 1999	85	2080
Moore's Lake	Spring 1999	87	2094

In considering the above numbers, it is important to note that the fish count refers solely to adult river herring and does not represent other species that may be utilizing the fish ladders. The relatively low number of fish passed at the Cooper River Lake fish ladder was due, in part, to a technical problem whereby the fish net was erroneously out of place during a portion of the sampling hours; this problem has since been rectified.

It is also important to note that it often takes from 3 to 8 years for the adult spawning run to establish itself after the fish ladders have been installed. PSEG is required under the final permit to continue to stock these impoundments until such time as five adults per acre utilize the ladders, which is the estimated number of adults required to achieve a full spawning run.

Comment 33

Several commentors note that the EEP provides benefits with respect to access to wetlands for the public. One commentor notes that over 20,000 acres are now open to the public for recreational, educational and research activities. Several commentors state that PSEG has done an extraordinary job in providing public access to the restoration sites. Another commentor notes that public access decisions have included the participation of community-based advisory committees, local officials, and neighbors. One commentor expresses gratitude for boat ramp access at the Maurice River Township

site and states that, because he frequently uses this boat ramp, he is able to witness the ever increasing family outings at the site. Another commentor, who lives in a host community to one of the EEP sites, states that the public use enhancements constructed are providing new opportunities for recreation, education and ecotourism activities that are an important part of the local economy. (Commentors 3, 7, 8, 21, 28, 32, 34, 49, 71, 97, 111)

Response 33

The Department acknowledges these supportive comments regarding the EEP and hereby incorporates this information into the Administrative Record.

Comment 34

Several commentors note that the EEP provides benefits to ecotourism. One commentor states that as a result of the EEP, there have been cultural preservation benefits to Salem and Cumberland Counties. This commentor further notes that the Abel and Mary Nicholson House was acquired as part of one of the EEP sites. With PSEG's support and involvement, this house has been preserved and has qualified for National Historic Landmark status, the first such landmark in Salem and Cumberland Counties. Another commentor expresses appreciation of the fact that PSEG has helped ensure restoration of the Abel and Mary Nicholson house. (Commentors 3, 21, 28, 32, 49, 80, 88)

Response 34

The Department acknowledges these supportive comments and agrees that the EEP provides benefits to ecotourism and hereby incorporates this information into the Administrative Record.

Comment 35

Several commentors note that the EEP provides educational benefits including public awareness of wetland systems as well as through public access. Some commentors state that the EEP staff has been diligent with respect to public education. Several commentors note that they and others incorporate the EEP sites as part of educational activities. One commentor states that PSEG provides and sponsors educational programs and opportunities that train future environmentalists. (Commentors 3, 4, 7, 21, 28, 49, 78, 79, 80, 90, 106)

Response 35

While educational benefits are not a consideration relevant to the issuance of a NJPDES permit, the Department acknowledges that the EEP provides educational benefits and hereby incorporates this information into the Administrative Record.

Comment 36

Commentors note that open space is important and the EEP helps to address the problem of lost open space. One commentor states that the EEP addresses the problem of wetlands being lost nationwide. Another commentor states that the EEP affords permanent protection of the life of the estuary and the stream corridors nurturing it which can only be accomplished by public or quasi-public land ownership. Another commentor states that the restoration of wetlands involved in the EEP is critically important given the continuous threats to our wetlands throughout New Jersey. One commentor states that it is imperative that the lands restored by the EEP remain as open space in perpetuity beyond 2015. This has been addressed to a limited extent by assigning The Nature Conservancy the stewardship of these lands. (Commentors 3, 4, 7, 27, 28, 80)

Response 36

The Department agrees that the EEP has resulted in permanent protection of the EEP lands as open space. The Department required and PSEG has recorded Deeds of Conservation Restriction on all

PSEG-owned wetland sites required under the July 20, 1994 draft NJPDES permit. In addition, the Department has required that any additional lands acquired under this permit also be subject to a recorded Deed of Conservation Restriction. As required by the July 20, 1994 permit, Deeds of Conservation Restriction protect these lands in their natural condition and provide for public access.

Comment 37

Several commentors state that the EEP sites are successful and PSEG is achieving the goals and objectives it set out to accomplish for the EEP. One commentor commends PSEG and NJDEP for what has become perhaps the most successful wetland restoration program in the world. Another commentor states that the wetland restoration has shown and been documented to be effective. Another commentor states that the measures undertaken by PSEG are already providing benefits in excess of what was originally anticipated upon initiation of the program. One commentor states that she is impressed by the level of success given the large scale of the project. Several commentors state that amazing results at the EEP sites were achieved in a relatively short period of time. Another commentor notes that several of the EEP sites are well ahead of schedule. Some commentors note the recolonization of all sites by beneficial marsh grasses; an abundance of fish and shellfish; and a greater and more diverse range of birds and wildlife since completion of the restoration construction activities. Another commentor states that the EEP restoration is working where fish responses, in terms of abundance, growth, species richness, reproduction, feeding and survival, are the same or better in the EEP restored sites as compared to the reference sites. (Commentors 3, 4, 8, 9, 21, 34, 71, 76, 78, 79, 80, 90, 91, 97, 123)

Response 37

The Department agrees that all EEP sites are currently in compliance with the vegetative success criteria set forth in the Management Plans filed for each EEP site. The Department also agrees that the EEP sites are providing multiple benefits to the environment, particularly with respect to fish production.

Comment 38

Several commentors note that the restoration at the Maurice River Township (MRT), Dennis Township and Commercial Township formerly diked salt hay farm sites give evidence of being an impressive success. One commentor states that the restoration at these sites have resulted in dramatic changes and a mosaic of new habitats are emerging. Another commentor states that the restoration at these sites has restored the connection of these lands to the Bay thereby increasing production of valuable biological components, and that these marshes appear to be returning to a very productive level for fish habitat and reproduction. One commentor states that the restoration of these sites have exceeded his expectations. Another commentor states that as a local landowner near the MRT sites, he reports that there have been no negative impacts. Another commentor suggests that full acreage credit be awarded to PSEG under the permit for these three sites. (Commentors 22, 23, 30, 32, 78, 84, 90, 108, 111, 120)

Response 38

The Department acknowledges these comments pointing to the success of the EEP. The Dennis, MRT & Commercial sites are in compliance with the vegetative success criteria and have exceeded the required percent coverage per year set forth in the Management Plans. These sites have resulted in the following amounts of acreage credit towards the 10,000 acreage requirement:

MRT:	1135 wetlands 108 uplands (36 acres creditable)
Commercial:	2894 wetlands 339 uplands (113 acres creditable)
Dennis:	369 wetlands 15 uplands (5 acres creditable)

Comment 39

Commentors state that the removal of the salt hay ponding areas has had mosquito control benefits. One commentor states that tidal inundation is the best method of eliminating salt marsh mosquito breeding habitat. As a result of tidal inundation at the Dennis site in 1996, the amount of pesticide used by the Cape May County Mosquito Commission has been dramatically reduced in post-restoration years 1997 and 1998 as compared to pre-restoration years 1994, 1995 and 1996. Specifically, 13,775 pounds of pesticide was applied to 2755 acres in 1994; 9675 pounds of pesticide was applied to 1935 acres in 1995; 2510 pounds of pesticide was applied to 1210 acres in 1996; 300 pounds of pesticide was applied to 150 acres in 1997 (post-restoration); and 250 pounds of pesticide applied to 125 acres in 1998. This reduced amount of pesticide use benefits Cape May citizens economically. The reduced amount of mosquitoes benefits Cape May citizens by reducing disease, and by reducing annoyance. Because mosquitoes are migratory, Cape May has benefited from the restoration at other EEP sites as well. Other commentors note that the removal of the salt hay ponding areas has enhanced the quality of life in MRT by helping to control mosquitoes and thereby reduce the likelihood of transmission of diseases carried by mosquitoes. (Commentors 33, 101, 123)

Response 39

Although the primary focus of the restoration of formerly diked salt hay farms was to increase fish production, the Department agrees that there have been other environmental benefits such as mosquito control as articulated here.

Comment 40

Commentors indicate that the productivity at the restored formerly diked salt hay farms is comparable to the reference marshes. Some commentors state that five years of sampling has confirmed that the restoration of formerly diked salt hay farms is successful and that these sites show similar species composition and growth as compared to reference sites. In addition, feeding and movement of striped bass, as tracked by ultrasonic tracking, are similar in restored and reference marshes showing that there's a trophic connection between both types of marshes and the bay. Research studies have confirmed the importance of *Spartina alterniflora* (*Spartina*) marshes to the productivity of bay fishes. These studies include stable isotope studies, which demonstrate that *Spartina* marshes contribute to marsh production. (Commentors 71, 78, 84)

Response 40

The Department has evaluated the studies performed here and the analyses of these studies by the experts on the MPAC and MAC. Based on this information, the Department agrees that these studies demonstrate the link between the restored marshes and fish production, as well as the fact that fish utilization at the restored marshes is comparable to the reference marshes.

Comment 41

Some commentors state that PSEG's restoration of the formerly diked salt hay farms has jumpstarted a process that may have already been occurring. For example, many of the salt hay wetland restoration areas were beginning to revert, albeit slowly, to salt marshes as a result of dikes breaching during storm events. One commentor specifically notes that the restoration of the Dennis Township

site, although successful, would have occurred on its own eventually. Another commentor states that because of global warming, the salt hay farm sites would have flooded anyway. (Commentors 1, 65, 68, 110)

Response 41

The Department agrees that the dikes at salt hay farms are sometimes subject to natural breaching during storm events. However, it is unknown how long it may take to fully breach the dike and have complete tidal inundation. Moreover, such uncontrolled breaches involve some risk to local ecology and upland communities. Until the area is fully subject to tidal inundation, these areas and the plant material they produce are not available to fish and therefore do little to contribute to fish production. PSEG's restoration activities at the MRT, Dennis and Commercial formerly diked salt hay farm sites included excavation of waterways that were designed and engineered to ensure optimal drainage and to ensure that tidal inundation was maximized. As a result of the restoration process, fish production has benefited, and in a relatively short amount of time.

For example, at the Commercial Township Site, natural restoration could have exposed the Bivalve and Port Norris sections of the Township to potentially devastating impacts. Left alone, breaches in the bayfront dikes, without the protection of the constructed and maintained upland dikes, could have exposed low lying areas to frequent flooding, threatening property, septic systems and wells. Moreover, without intervention, portions of the sites would likely have experienced significant erosion as exhibited at a nearby formerly impounded marsh, resulting in loss of marsh habitat and large expanses of open water or mud flat. Please refer to Response 43 for an example of an impact to horseshoe crabs as a result of natural breaching of a dike at MRT.

Comment 42

One commentor notes that salt water intrusion has caused the death of hundreds of acres of trees at MRT. Another commentor expresses his disappointment with the fact that many trees are no longer there and that the whole area is flooded. (Commentors 65, 116)

Response 42

The Department recognizes that there were trees lost as a result of restoration at MRT. However, it is important to note that these lands were historically open to tidal inundation and were artificially diked as salt hay farms. Restoration of these lands simply returned them to their natural condition as tidally influenced lands.

Comment 43

Some commentors state that there have been impacts to horseshoe crabs as a result of the EEP. One commentor states that Thompsons Beach used to be a prime breeding ground for horseshoe crabs. However, as a result of the EEP restoration activities, the channels dug by PSEG have acted like giant magnets drawing millions of crabs to their deaths either by commercial bait fisherman (who are legally allowed to collect the stranded crabs) or by being stranded in the back channels. Another commentor agrees that horseshoe crabs have been a problem at the Thompsons Beach site and this site is now the largest site for the harvesting of horseshoe crabs. A commentor states that PSEG has not proven that crabs can get out of the site. There are still problems with crabs. One commentor states that millions of horseshoe crabs are killed each year at MRT. (Commentors 53, 65, 86)

Response 43

The Department acknowledges that there were some temporary impacts to horseshoe crabs prior to completion of PSEG's restoration activities, although these impacts have since been rectified. Prior to completion of PSEG's restoration activities at MRT in the spring of 1998, large numbers of horseshoe

crabs (*Limulus polyphemus*) were observed stranded on the nearly level, unvegetated marsh plain. Historically, when the perimeter dikes were in place and salt hay farming was practiced at the site, horseshoe crabs were unable to enter the site. After farming activities ceased and prior to ownership of the property by PSEG, breaches in the dikes developed during the winter of 1992/1993, due to severe storms and natural erosion. Horseshoe crabs were then able to directly access the site from the Bay. As erosion continued to enlarge the natural breaches, the marsh plain began to drain on low tides. These breaches caused high velocity flood tide currents, which carried horseshoe crabs onto the unvegetated marsh plain where they appeared to become disoriented. The lack of tidal channels typical of those present in a natural salt marsh appeared to hinder the crabs from migrating out of the marsh. Thus, many horseshoe crabs became stranded on the marsh plain in 1996 and 1997.

This situation was substantially improved by PSEG through modifications to drainage at the site which took place after the 1996 and 1997 horseshoe crab spawning seasons, including the creation of new tidal channels and the widening and deepening of existing channels. During the 1998 horseshoe crab spawning season as well as the 1999 and 2000 seasons, there were no more dead or stranded horseshoe crabs at the MRT site than the Department found elsewhere in the State. As revegetation of the MRT site continues to progress, the number of horseshoe crabs which traverse the creek banks on to the marsh plain should be further diminished.

It is also important to note that, as a result of PSEG's compliance with the wetlands restoration conditions of the July 20, 1994 permit, there is an increased amount of land available to horseshoe crabs at the MRT, Dennis and Commercial Township sites. This is due to the fact that land previously not accessible to tidal inundation and aquatic life is now accessible. Research has also demonstrated that the eggs spawned in this newly accessible habitat are viable and hatch successfully.

The Department does not have the authority to control the harvesting of horseshoe crabs through its NJPDES regulations; however, the Division of Fish and Wildlife has proposed regulations that will control future harvesting at MRT.

Comment 44

Several commentors note that PSEG has successfully preserved the Bayside Tract and other uplands. The preservation of the Bayside Tract and other uplands are important. One commentor notes that the protection of this site from development is particularly important since it is adjacent to some of the most productive oyster beds in the Delaware Bay. Another commentor suggests that full acreage credit be granted for this site. (Commentors 28, 30, 78, 84, 111)

Response 44

The Department agrees that the preservation of the Bayside Tract and other uplands is environmentally beneficial. While uplands serve an important environmental purpose, the purpose of the wetlands restoration condition is to provide benefits to fish production. In order to balance this central purpose with the additional benefits provided by preservation of uplands, uplands are credited at a 3 to 1 ratio. The permittee has complied with the July 20, 1994 permit condition to preserve 2585 acres of existing wetlands and has preserved 1822 acres of upland areas (which contributes an additional 607.33 credit) at the Bayside Tract.

The Department has credited this acreage in accordance with the July 20, 1994 NJPDES permit.

Comment 45

Some commentors indicate that the EEP *Phragmites*-control sites are working. Some commentors remark that, although some sites are improving faster than others, all are on a trajectory of success. (Commentors 5, 71, 78, 90, 109)

Response 45

The Department agrees that the permittee is currently in compliance with the vegetative success criteria set forth in the Management Plans for all *Phragmites*-dominated EEP sites in New Jersey and Delaware.

Comment 46

One commentor states that PSEG has attained a qualified level of success at the relatively small Cohansey site. Full credit under the permit should be given at this site while DEP should allow the restoration to continue. (Commentor 111)

Response 46

The Department agrees that the permittee is currently in compliance with the vegetative success criteria set forth in the Management Plan for the Cohansey site. This site has resulted in the preservation and/or restoration of 910 acres of wetlands and 145 acres of uplands. Because this site was only 45% dominated by *Phragmites* at the onset of restoration activities, only 455 acres of wetlands is creditable towards the wetland restoration permit requirement on the permit. Since uplands are creditable at a 3:1 ratio, 48.33 acres of uplands are creditable towards the wetlands restoration permit requirement.

Comment 47

A local landowner near the Cohansey site states that despite the constant assault to *Phragmites* by PSEG, *Phragmites* is still present. (Commentors 11, 122)

Response 47

As stated in Response 46 the permittee is currently in compliance with the vegetative success criteria at the Cohansey site which requires an approximate 9% coverage of *Spartina* and other desirable marsh vegetation per year. However, the final success criteria of 95% coverage by beneficial vegetation is not required until October 2011. Until that time, restoration is still ongoing and not considered to be complete.

Comment 48

Many commentors state that restoration of some areas of the *Phragmites*-control sites have met with limited success particularly with regard to the Alloways Creek site. Several commentors recommend that further spraying in such areas not take place. Although some commentors commend PSEG for the extensive permanent wetland restoration it has achieved, they are very concerned about the lack of progress in controlling *Phragmites* at the low salinity, high elevations of the Alloways Creek site. Several commentors express concern that the only way to control *Phragmites* in these areas would be to engage in a regular repetitive program of glyphosate (i.e. herbicide spraying) application. One commentor states that the readiness to receive a higher order of vegetation is still in doubt at the areas of *Phragmites* control sites that are problematic. While some commentors state that they do not question the efficacy or safety of the herbicide used, it is unlikely that a large portion of the Alloways Creek site will achieve long term success. Another commentor questions why the Department is crediting PSEG with 2813 acres of wetlands for the Alloways Creek site towards the permit

requirements if this site is still 31.4% *Phragmites*-dominated as indicated on page 42 of the December 8, 2000 Fact Sheet. (Commentors 22, 23, 28, 30, 35, 52, 53, 65, 68, 94, 98, 108, 111, 120)

Response 48

The Department has determined that PSEG is in full compliance with the vegetative success criteria at the Alloways Creek site at this time.

The Department agrees that some areas of the Alloways Creek site have met with limited success. Although the Department has determined that safety issues regarding the use of glyphosate have been adequately addressed, the Department has repeatedly gone on record stating that it does not support open-ended, perpetual spraying of this herbicide as discussed in more detail later in [Response 66](#). In consideration of the Department's position and public comments on this issue, the Department is pleased to note that PSEG has submitted a proposal to the Department on June 8, 2001, which addresses these comments. By way of a letter dated June 8, 2001, PSEG informed the Department of its decision to make certain changes to its restoration program for the Alloways Creek site. Specifically, PSEG stated that it would cease utilizing herbicides for the management of approximately 1000 acres of the western portion of the Alloways Creek site; retain the 1000 acres of *Phragmites*-dominated wetlands; and purchase approximately 1000 additional acres to ensure compliance with the permit conditions. The Department intends to pursue implementation of this decision by PSEG with appropriate refinements, as necessary.

Comment 49

The Alloways Creek site should continue as a test area for experimentation of *Phragmites* control techniques. One commentor further suggests that acreage credit be granted for the relatively small portion of the site that success has been achieved and for any upland buffers. (Commentors 28, 111, 120)

Response 49

The Department does support continued research for *Phragmites* control techniques in test areas as discussed in [Response 64](#). The Department notes that PSEG has filed an application with the Land Use Regulation Program for the continuation of the test area program through 2005.

Comment 50

One commentor states that no compensatory credit should be awarded to PSEG for *Phragmites* areas that are mowed and only partial credit should be awarded for areas of "mixed vegetation" based on the amount of *Phragmites* within those areas that have been reduced and will not return. (Commentor 1)

Response 50

As stated previously, the permittee is currently in compliance with the requirement of approximately 9% coverage of *Spartina* and other desirable marsh vegetation at all sites, including the Alloways and Cohansey sites where adaptive management techniques such as mowing have occurred and continue to occur. Areas that have recently been mowed and continue to be mowed do not typically have an established amount of beneficial vegetation and therefore do not count towards the percentage cover of beneficial vegetation. Regarding those areas that are "mixed vegetation", the Department only allows credit for those areas covered by *Spartina* or desirable vegetation as qualifying towards the vegetative goals.

Comment 51

Commentors state that the 95% reduction goal for *Phragmites* and 95% conversion goal to *Spartina* are unachievable given current vegetative coverage at Alloways and Cohansey. (Commentors 28, 65, and 94)

Response 51

The Department does not agree that these goals are unachievable for the Cohansey site as discussed in Response 46. Although the Alloways site is currently in compliance, the Department does have concerns that the permittee will be able to maintain compliance status with the interim vegetative success criteria for certain portions of the Alloways site as discussed in Response 48.

The specific targets of the wetlands restoration program are established through the Management Plan process, which also includes success criteria and an Adaptive Management Process. The Department has fully discussed the Management Plan process and this process is continuously monitored by the Department and the EEPAC.

Comment 52

One commentator states that the Alloways and Cohansey sites are failures. Another commentator states that PSEG has not demonstrated that it can sustain any areas on the Alloways and Cohansey sites where it is successful in replacing *Phragmites* with *Spartina*. After PSEG's permit expires, *Phragmites* will reinfest these areas. (Commentor 65, 68)

Response 52

The Department does not agree that these sites are failures as discussed in Response 46 and Response 48.

Comment 53

One commentator states that *Phragmites* can not be eliminated or controlled unless the salinity and elevation conditions are right. Another commentator states that removing *Phragmites* is almost impossible because it is indigenous to the area. (Commentor 94, 95)

Response 53

The Department agrees that salinity and elevations are important factors that contribute to the ease of restoration for *Phragmites*-control. Any lands that are deemed "failed" by the Department (i.e. not in compliance with the vegetative success criteria set forth in the Management Plan) must be replaced in accordance with Part IV, item G.3.c. Please refer to Response 48, which discusses PSEG's proposal for replacement acreage.

Although some research indicates that *Phragmites* is indigenous to the United States, research indicates that *Phragmites* that is commonly found along the Delaware Bayshore is a European strain that is not indigenous to the area.

Comment 54

This commentator states that it was shocked to see that the twelve-year time frame for compliance with the success criteria has been extended an additional twelve years with a date of 2012 for the Alloways Creek site. This is an admission that the wetlands experiment is failing. NJDEP can not enforce the final permit since it requires action beyond the twelve-year time line. (Commentor 68)

Response 54

The criteria for compliance dates with the interim and final success criteria were set forth in the Management Plans for each site. These compliance dates have not been extended. Restoration activities were officially completed in accordance with the schedules in the approved Management Plans in September 1999 at the New Jersey *Phragmites*-dominated wetland restoration sites and in June 2000 at the Delaware sites. For the *Phragmites*-dominated wetland restoration sites, the NJDEP-approved Management Plans specify a one-year lag following the completion of restoration implementation activities before re-vegetation commences. Thereafter, the Management Plans anticipate a twelve-year restoration period. For all *Phragmites*-dominated sites, 2000 is the first full growing season following completion of restoration efforts and is the prescribed lag year within the success criteria.

However, please note that the Department did make an error in translating these Management Plan criteria into actual compliance dates where these dates were included in the Fact Sheet of the December 8, 2000 draft permit. As described in PSEG Comment 13, the compliance dates for the EEP sites are as follows:

	<u>Completion of Restoration Implementation Action</u>	<u>Interim Vegetative Criteria¹</u>	<u>Final Success Criteria¹</u>
MRT	March 1998	October 2004	October 2009
Dennis	October 1996	October 2003	October 2008
Commercial	November 1997	October 2004	October 2009
Alloways	September 1999	October 2005	October 2011
Cohansey	September 1999	October 2005	October 2011
The Rocks	June 2000	October 2005	October 2011
Cedar Swamp	June 2000	October 2005	October 2011

¹ Criteria dates correspond with the end of the growing season of the appropriate year. The interim criteria at the former salt hay farms are measured following a two-year lag period and five growing seasons. The interim criteria at the former *Phragmites*-dominated sites are measured following a one-year lag and five growing seasons. The final success criteria at the former salt hay farms are measured following a two-year lag period and twelve growing seasons. The final success criteria at the former *Phragmites*-dominated sites are measured following a one-year lag period and twelve growing seasons. Data reports and evaluations are not required until June 30 of the year following the year in which data is collected. For example, at the MRT site, the results of the October 2004 interim criteria will not be submitted until June 30, 2005.

Comment 55

Some commentors note that *Phragmites* control, such as that which is being performed for the EEP *Phragmites*-control sites, is a major benefit to the Delaware Bay ecosystem. One commentor states that while recent studies performed by PSEG demonstrate that *Phragmites* detritus (fine particulate food matter) does enter food webs, it has a number of other impacts such as changes in channel topography and increased shading with effects on benthic algae productivity. It also appears that the food quality of *Phragmites* detritus is not as good as *Spartina* detrital material. Another commentor states that recent research is clear in that *Phragmites* has a negative effect on the production of mummichogs, an ecological part of the marsh, and that an increase in *Spartina* increases mummichog abundance. (Commentors 78, 80, 109)

Response 55

Based on information that it has to date, the Department agrees with these comments and hereby incorporates this information into the Administrative Record.

Comment 56

One commentor states that undue criticism has been unfairly leveled at the EEP's *Phragmites*-control efforts. *Phragmites* has infested about 1/3 of Delaware's tidal wetlands at the expense of many important wetland values and functions, in particular wildlife habitats. *Phragmites*-control efforts are beneficial for a wide range of estuarine natural resources. Another commentor states that *Phragmites* has little value. (Commentor 61, 93)

Response 56

The Department acknowledges these comments and hereby incorporates this information into the Administrative Record. As discussed in Response 55, the Department agrees that *Phragmites* is not as beneficial for fish production as compared to beneficial vegetation such as *Spartina alterniflora*, based on information that it has to date.

Comment 57

Commentors note that the benefits of *Phragmites* depend on the context. These commentors encourage research about *Phragmites* since it is not well understood. Bird use of *Phragmites* is extensive and *Phragmites* that are productive for birds should not be managed by spray. *Phragmites* eradication may not always be desirable and spraying is not always the best management practice. When *Phragmites* is wet, ponded and flowed by channels, it can be productive. (Commentors 22, 108)

Response 57

The Department agrees that further research about *Phragmites* is worthwhile and notes that several commentors encourage such research as described in Comment 27 and Comment 64. The Department also agrees that small patches of *Phragmites* are sometimes useful for certain species of birds, although these species will often use other habitats as well. The Department does not agree that dense, monotypic stands of *Phragmites* are as beneficial for bird use or for fish production as lands dominated by more desirable vegetation such as *Spartina*. Additionally, the Department does not advocate an open-ended perpetual herbicide spray program as discussed in further detail in Response 65.

The Department understands that *Phragmites* that is wet, ponded and flowed by channels may be productive for fish to some extent. However, based on information that it has to date, the Department does not agree that *Phragmites* dominated lands are as beneficial for fish production as compared to lands dominated by *Spartina* as described further in Response 58.

Comment 58

Some commentors state that the EEP should be reassessed. It is not clear that *Phragmites* is useless. One commentor states that fish and invertebrates utilize *Phragmites* marshes in similar ways as they use *Spartina* marshes. It is also shown that the detritus from *Phragmites* is utilized by detritus feeders and gets into food webs in the same way as *Spartina* detritus. One commentor stated that the replacement of *Phragmites* with *Spartina* is not in the best interest of the environment. Another commentor states that it is not clear that *Phragmites* are detrimentally invasive. Another commentor states that there is increasing scientific evidence that *Phragmites* provides equal food to

many species of fish as *Spartina* and that *Phragmites* supports many kinds of wildlife. (Commentors 2, 6, 26, 68, 94, 119, 122)

Response 58

Phragmites is an aggressively invasive plant that often chokes out other vegetation resulting in monotypic stands of *Phragmites*. The goal of the wetlands restoration condition contained in the July 20, 1994 permit and retained in the December 8, 2000 draft permit is to increase fish production. Based on information that it has to date, the Department has determined that lands dominated by desirable vegetation such as *Spartina* are more productive for fish as compared to lands dominated by *Phragmites*. Although the Department understands that recent research shows that *Phragmites* detritus does enter food webs, *Phragmites* dominated lands have a number of other impacts that are detrimental for fish production. These include changes in channel topography resulting in a lesser amount of area being available to fish. This is due to the fact that sediments tend to accumulate amongst the *Phragmites* litter in *Phragmites* dominated areas thereby raising the elevation of the marsh. Lastly, increased shading in monotypic stands of *Phragmites* results in a lesser amount of benthic algae production where many species rely on benthic algae as a food source. The Department has never stated that *Phragmites* is useless. Rather, the Department has determined that lands dominated by beneficial vegetation such as *Spartina* are more advantageous as compared to lands dominated by *Phragmites* from the perspective of fish production, based on information that it has to date.

Comment 59

One commentor states that in addition to not fulfilling the requirements of Section 316(b), PSEG can not substantiate that the wetlands experiment is enhancing the fish populations of the Delaware. This is based on many factors including: (1) PSEG's failure to conduct any baseline data that demonstrates whether food or habitat were limiting factors for the aquatic communities; (2) PSEG is unable to demonstrate that the wetlands it is seeking to restore are superior in terms of food and habitat for fish and other aquatic populations as compared to *Phragmites* dominated wetlands; (3) it is possible that fish use *Phragmites* marshes in a similar way to *Spartina* marshes; (4) PSEG has failed to demonstrate that even if it is successful at replacing *Phragmites* with other plants, it is likely that *Phragmites* will invade those areas (i.e. Cohansey and Alloways Creek sites) and (5) PSEG cannot document the number of fish benefited by this wetlands effort. (Commentor 68)

Response 59

As discussed in Response 9, the wetlands restoration program was not included as part of the best technology available determination under Section 316(b). Moreover, the Department also does not agree that the wetlands restoration program is an experiment.

At the formerly diked salt hay farms, PSEG's restoration activities opened up a significant amount of area to fish populations since restoration resulted in the removal of impediments (i.e. dikes) thereby restoring natural tidal inundation. Therefore, food and habitat are made available to fish that were not available prior to restoration activities. At the *Phragmites* dominated sites, food and habitat may have been available to fish prior to restoration activities. However, as described in Response 58, *Phragmites* dominated lands have a number of impacts on food and habitat that are detrimental to fish production. PSEG is currently in compliance with the vegetative success criteria at the Alloways and Cohansey sites as described in Response 46 and Response 48. It is premature to determine whether or not PSEG can sustain beneficial vegetation at the Alloways and Cohansey sites on a long-term basis. If PSEG cannot maintain compliance status with the vegetative criteria, the Department can require replacement acreage as described in item G.3.c. of Part IV of this final permit. Lastly, ecosystems are complex and as a result of this complexity, it is difficult to quantify the amount of fish

produced in a restored marsh. That being stated, this does not negate the fact that marshes are beneficial to fish production. This is discussed in further detail in [Response 79](#).

Comment 60

Several commentors state that it is time to end experimentation on sensitive marshlands. Several commentors state that PSEG should instead be required to permanently protect these lands in their natural condition. One commentor states that the EEP is an “experiment” that relies on herbicide and the manipulation of sensitive marsh land which deprives the bay’s aquatic life of food and shelter. Another commentor states that the EEP has resulted in dead mud flats and a legacy of more environmental harm than would have happened if nothing had been done. (Commentors 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 29, 31, 55, 56, 60, 63, 64, 68, 72, 73, 74, 86, 118)

Response 60

The Department disagrees that the EEP is an experiment. As discussed in [Response 9](#), the Department imposed the wetlands restoration requirements and fish ladder conditions because these conditions were clearly environmentally beneficial and have and will continue to help minimize the potential impacts from the cooling water intake structure. Salt marshes are an integral part of the estuarine system and are necessary for viable fish populations, particularly in the mid-Atlantic coastal area. Increasing the amount of salt marshes through restoration will increase productivity. Likewise, restoring river herring runs by installing fish ladders to allow fish to overcome impediments such as dams is also important for the productivity of river herring species. PSEG solicited the advice of the Management Plan Advisory Committee and Monitoring Advisory Committee in implementing these requirements. The role of the Management Plan Advisory Committee was to provide advice concerning wetlands restoration activities. The role of the Monitoring Advisory Committee was to provide advice concerning biological monitoring activities.

The Department does not agree that the EEP results in a deprivation of food and shelter to the bay’s aquatic life. To the contrary, the Department has determined that the EEP has resulted and will continue to result in an increased amount of detrital material being available to fish thereby increasing fish production. In addition, the EEP has resulted in an increased amount of habitat available for fish. Although some restoration activities may result in the temporary presence of mud flats until beneficial vegetation is able to establish itself, the Department maintains that restoration activities are beneficial to fish production. Also, the Department does not agree that mud flats are “dead”. Rather, mud flats are producers of diatoms and microscopic algae; are an important part of wetland ecology; provide an important food source directly to some species of fishes; and provide food for other aquatic organisms upon which fisheries feed.

Comment 61

One commentor states that although recent research shows that larval killifish (i.e. mummichogs) may prefer *Spartina* over *Phragmites*, the restoration process of removing *Phragmites* and replanting *Spartina* is of relatively small benefit once the restored marsh has fully developed after perhaps a decade or more. In the meantime, a more functional marsh is replaced with a far less functional one. Restored marshes do not acquire the diversity and function of natural marshes for many years, possibly decades. Thus, the current permit is not justified. (Commentor 2)

Response 61

First, it is important to note that the current permit arguably would have been legally justified under Section 316(b) without the EEP. The Department determined that the present cooling water intake structure, in conjunction with a continued intake flow limitation, continued use of the modified Ristroph intake screens which were developed pursuant to the 1994 permit, further improvements to the fish

return system, and study of a multi-sensory hybrid system constituted best technology available under Section 316(b). The wetlands restoration program was a measure voluntarily proposed by the permittee and was incorporated into the July 20, 1994 NJPDES permit where it was retained in this final permit.

As discussed in Response 54, restoration is ongoing at the EEP sites. As part of PSEG's restoration activities, continued comparisons of the restored marshes to reference marshes (i.e. natural marshes selected by PSEG) occurs on a frequent basis to gauge the progress of the restoration. Thus far the restored marshes are showing a similar diversity and function to the reference marshes, even though the EEP sites are not yet complete. It is also important to note that the formerly diked salt hay farms were historically opened to tidal inundation and were artificially diked to create salt hay farms. Therefore, these lands were previously "natural marshes" and, as a result of PSEG's restoration activities, are being returned to their natural condition.

Natural tidal inundation approaching the hydrologic success criterion is generally present at the restored salt hay farm sites. Engineered tidal channels have initiated natural estuarine processes that support the establishment of a system of intertidal mud flats and smaller, or higher order, creeks that are characteristic of a fully functioning marsh system. As the geomorphologic and hydrologic conditions have recovered, these sites have re-vegetated with *Spartina* spp., and other desirable species, at levels exceeding original expectations. In fact, the Dennis Township site is achieving vegetation coverage by *Spartina* spp. and other desirable, naturally occurring marsh vegetation at levels approaching the final vegetation coverage specified in the final success criteria. Vegetation and algal productivity monitoring demonstrates values, even at this early stage in the restoration process, that are comparable to the reference marshes.

Furthermore, many aspects of the structure (i.e., species richness, species composition, abundance) of the marsh fauna (invertebrates, fishes and crabs) quantified at the restored salt hay farm sites are equivalent to those of the reference marshes or are on a trajectory approaching reference marsh conditions.

Restoration at the *Phragmites* sites is at an earlier stage in the process. *Phragmites* coverage has been substantially reduced. The restored sites are now becoming vegetated with the *Spartina* spp. and other desirable, naturally occurring marsh vegetation. Removal of the *Phragmites* vegetation has created conditions facilitating natural estuarine processes. Removal of *Phragmites* has begun to enhance the marsh including the development of the system of intertidal mud flats and higher order channels characteristic of a fully functioning marsh. The rivulets, which provide the pathways for killifish access to the marsh plain for feeding, growth and reproduction, are beginning to reform. Restoration efforts on these sites continue and supplemental measures will be implemented as needed in the future to maintain and establish conditions that will provide a competitive advantage to *Spartina* spp. and other desirable species.

Comment 62

Some commentors state that *Phragmites* does a better job at holding heavy metals than other plants. Some commentors state that there is current research that shows that *Phragmites* sequesters mercury, other heavy metals, phosphorus and nitrogen out of the water and by destroying *Phragmites* these nutrients and metals are re-released to the bay and can cause harm. Several commentors state that recent research shows that *Phragmites* marshes are better equipped than *Spartina* marshes in improving water quality. Another commentor states that *Phragmites* is a superlative water purifier. (Commentors 6, 86, 94, 119, 122)

Response 62

The goal of the wetland restoration conditions of the July 20, 1994 permit, and retained in this final permit, is to increase fish production. The Department maintains that beneficial vegetation such as *Spartina* is advantageous over *Phragmites* dominated lands from the perspective of fish production as discussed in Response 58.

Contaminants such as heavy metals, nutrients and phosphorus are not typically present in the areas associated with the EEP given the undeveloped, rural nature of these lands and their surrounding areas. It should be noted that wetland systems in general act as a superlative water purifier, and this function is not limited to strictly *Phragmites*.

Comment 63

One commentor states that the EEP is not an addition of wetlands. Instead it is a conversion of one type of wetlands to another, namely salt hay farms and *Phragmites*-dominated lands to *Spartina* wetlands. (Commentor 65)

Response 63

The Department agrees that the restoration of *Phragmites*-dominated wetlands to beneficial vegetation such as *Spartina* is a conversion of one type of wetlands to another; however, the EEP is a restoration program, not a wetlands creation program. *Spartina alterniflora*-grown plant material is produced and distributed throughout the Bay and is decomposed over the course of a year or more. It provides the most important source of plant energy to fishes occurring there. In addition, it provides important living space for several forage fishes which is not the case in *Phragmites*-dominated areas. Regarding the formerly diked salt hay farms, the wetlands restoration provisions in the permit do not require the creation of marsh, but rather require the return of areas which were once highly productive salt marsh to their natural condition as discussed in Response 59.

Comment 64

Commentors express support for PSEG's extensive and intensive efforts in pioneering alternative methods for *Phragmites*-control. One commentor encourages the continuance of experimenting with alternative means of *Phragmites*-control and states that these alternatives must continue to be painstakingly documented. This is the single most important thing that can be derived from this project, given its unparalleled size. Several commentors state that effective methods of controlling *Phragmites* can be applied beyond the Delaware Bayshore. (Commentors 28, 61, 78, 90, 120)

Response 64

The Department agrees that the research of alternate methods of *Phragmites*-control is beneficial and hereby incorporates this information into the Administrative Record.

Comment 65

One commentor states that spot applications of glyphosate are reasonable and to be expected. Long term management intervention is necessary for this tenacious noxious weed. This commentor expresses appreciation for the company's commendable and voluminous investigation of glyphosate. This research has confirmed what many natural resource agencies have known, namely that glyphosate is a safe, efficient, cost-effective method of *Phragmites*-control. (Commentor 61)

Response 65

Requests by the permittee to apply glyphosate to the EEP sites are evaluated by the MPAC, and through the Plan of Action required under PSEG's Land Use Regulation Program (LURP) permit by the Department's LURP and by the Bureau of Pesticides. In addition, the permittee can not request a

permit to apply glyphosate for an area in excess of one third of the area of the restoration site as dictated in the Management Plans for the Alloways and Cohansey sites. The Department continues to encourage the use of alternate *Phragmites*-control techniques rather than the use of herbicides such as glyphosate as described in the Fact Sheet of the December 8, 2000 draft NJPDES permit. The Department does not advocate an open-ended perpetual herbicide spray program.

The Department agrees that the permittee has performed an extensive investigation regarding the safety of glyphosate. The Department also recognizes that glyphosate is registered by USEPA for use in an aquatic environment as further discussed in [Response 69](#).

Comment 66

Herbicide should not be used as a long term management tool but should be restricted to the initial phase of marsh restoration. One commentor states that repetitive glyphosate applications were not envisioned as a path to marsh restoration and does not support repeated sprayings. (Commentor 27, 120)

Response 66

The Department does not advocate an open-ended perpetual spray program of the herbicide glyphosate. Please refer to [Response 65](#) for more detail.

Comment 67

One commentor states that despite assertions by NJDEP in the permit saying it will not support a wetlands program that relies on perpetual herbicide use, NJDEP has taken no concrete steps to demonstrate this commitment. NJDEP has allowed three years of aerial applications and has already approved another two years of herbicide application. NJDEP has denied repeated requests from the public that herbicide application be stopped. NJDEP has failed to include any criteria for "failed acreage" so that replacement acreage can be substituted. Another commentor states that even though the Department states that it will not buy into a perpetual spray program, it continues to give aquatic use permits for up to one-third of the Alloways and Cohansey sites which will continue until 2012. (Commentors 68, 94)

Response 67

Decisions to grant approvals for the spraying of the herbicide glyphosate are strictly not part of the NJPDES permit process and instead are evaluated by the MPAC, the Department's Bureau of Pesticide Control and LURP, as discussed in [Response 65](#). The Department does not agree that it has committed to giving aquatic use permits for up to one-third of the Alloways and Cohansey sites until 2012, nor does the Department agree that it has already approved another two years of herbicide application.

Comment 68

Several commentors generally request that the spraying of glyphosate be stopped. Some commentors state that *Phragmites* control is not possible. (Commentors 6, 53, 64, 65, 68, 85, 86, 94, 98, 113, 118, 119, 121, 122)

Response 68

Please refer to [Response 65](#).

Comment 69

Many commentors note that the use of herbicide is not environmentally friendly. One commentor states that NJDEP should deny any more permits for the spraying of glyphosate until all questions

about its effects on marine life are answered. Another commentor states that spraying of glyphosate adds another level of public health insult and will further degrade environmental health in Salem County. One commentor expresses concern that glyphosate will someday show up in food. Another commentor states that herbiciding of the marshlands should be stopped since there's a question regarding the toxicity of the herbicide as well as to whether or not it will work. One commentor states that over 25,000 pounds of herbicide have been aerially applied with over 300 pounds applied by hand. Another commentor states that there is concern that glyphosate and/or any of the inert ingredients will go into our wells or water supplies. (Commentors 6, 11, 53, 85, 105, 113, 121)

Response 69

Glyphosate is registered by the USEPA for use in an aquatic environment. As such, the Department has determined that its use is acceptable in a marine environment, providing the Department has determined that the issuance of an aquatic use permit is appropriate. This evaluation process is described in Response 65. Many natural resource agencies with years of experience in *Phragmites*-control use glyphosate on a regular basis since it is one of the most effective means to eradicate *Phragmites*.

Glyphosate is characterized as having a short half-life and binds quickly to soils and sediments. As such, glyphosate was not expected to be a concern to private well supplies or even expected to be detected. Nonetheless, PSEG established a monitoring program to monitor private wells in the vicinity of the *Phragmites*-dominated EEP lands during its 1996, 1997 and 1998 glyphosate applications. Based on the results of this monitoring, glyphosate was determined to have no impact to private well supplies.

Comment 70

One commentor states that it is unknown what the long term effects of spraying tons of the herbicide glyphosate on the wetlands has on the horseshoe crabs. (Commentor 53)

Response 70

PSEG has applied glyphosate to the *Phragmites*-dominated EEP sites, namely the Alloways, Cohansey, the Rocks and Cedar Swamp sites. Horseshoe crabs are concentrated in the lower reaches of the Bay including areas of the MRT, Dennis and Commercial sites. These three sites have not been subject to herbicide spray; therefore, glyphosate has not impacted horseshoe crabs at these sites.

Comment 71

Many commentors state that NJDEP should require PSEG to preserve additional acreage. (Commentors 10, 12, 15, 16, 17, 18, 19, 20, 25, 31, 72, 74, 86)

Response 71

The Department has determined that the acreage specified in the July 20, 1994 permit and retained in this final permit for the purposes of wetlands restoration is sufficient to minimize the potential for long-term adverse impact due to the operation of the Salem intake structure. Therefore, the Department does not believe it appropriate to modify this permit condition to require additional wetlands or upland acreage at this time. The Department also maintains that the ratio of 3:1 credit for uplands is appropriate and is therefore not in need of modification.

Additional detail regarding the basis and background for the acreage values required in the permit is included in Response 72 and 79.

Comment 72

Commentors state that acquisition and permanent protection of additional lands, including upland buffers, should be required to replace the areas that Phragmites can not be eliminated without continuous spraying, namely those areas of the Alloways Creek sites. Some commentors applaud the protection of uplands and urge PSEG to expand their upland protection plans by purchasing additional upland areas and that priority should be given to acquiring lands in the Maurice River Basin. One commentor asks that consideration be given to including large acreage of forested wetlands and upland buffers in the Alloway Creek watershed. Several commentors specifically request for PSEG to be required to substitute additional wetlands, uplands and horseshoe crab habitat at a 3:1 ratio in lieu of the continued mitigation efforts (i.e. herbiciding) at the Alloways and Cohansey sites. (Commentors 22, 28, 30, 35, 64, 65, 68, 94, 108, 111, 120)

Response 72

The wetlands program was proposed by PSEG to address the concern that the losses had the potential to cause long-term adverse effects on certain populations. It is intended to increase fish productivity in the Delaware Estuary to a level equivalent or greater than estimated fish mortality. The amount of acreage selected for the program was determined, using conservative assumptions, based on the incremental detrital and resulting fish production per acre of restored wetlands and the estimated amount of fish destroyed by the cooling water intake structure.

Based on information that it has to date, the Department has not basis to require PSEG to acquire additional lands. Notwithstanding the above, PSEG has recently informed the Department of its intention to manage a portion of its Alloway Creek Watershed site differently and to purchase approximately 1,000 additional acres in the Delaware Estuary under this program. See Response 48.

It should also be noted that the Department has deleted the regulatory cap of 6000 acres of upland buffer creditable towards the wetlands restoration requirement of 2000 acres, as indicated in item G.3.a at Part IV of the December 8, 2000 draft and this final permit. Therefore, there is no limit to the amount of upland buffer the permittee can purchase.

Comment 73

One commentor suggests that a percentage of upland creditable for the permit be increased in the vicinity of the salt hay farms to contribute to long term water quality. Another commentor suggests that NJDEP allow a greater amount of acreage as upland buffers under the permit if additional wetlands are not available. (Commentors 108, 111)

Response 73

Please refer to Response 72.

Comment 74

One commentor states that any new EEP projects should be identified and located more equitably between New Jersey and Delaware. The regulatory cap for 80% of such lands being located in New Jersey should be modified. (Commentor 61)

Response 74

The July 20, 1994 final permit and this final permit allow for up to 20% of the wetlands restoration work creditable towards the NJPDES permit requirement to be performed in Delaware. This provision was based on management and enforcement considerations. In environmental terms, it does not matter which side of the Delaware Estuary the restoration takes place, the increase in fish productivity will result in biological benefits to the entire Delaware Estuary. However, in order for the Department

to more effectively monitor the restoration efforts and conserve its resources, no more than 20% of the wetlands to be restored can be located outside New Jersey for the purposes of the permit. Therefore, the Department does not agree that it is appropriate to modify this regulatory cap at this time.

The Department also notes that through a settlement of DNREC's 1994 adjudicatory hearing request, PSEG funded restoration of additional *Phragmites*-degraded wetlands. PSEG and DNREC have also recently entered into another settlement resolving DNREC's comments on the 2000 draft permit, which provides additional funding for wetlands restoration in the State of Delaware.

Comment 75

One commentor states that additional lands are available in Delaware to be opened for tidal exchange. Specifically, Thousand Acre Marsh, Red Lion Creek Marsh and the Milford Neck complex could be restored in a manner similar to the non-creditable work done by PSEG at Augustine Creek Marsh. PSEG's support of additional conservation acreage in Delaware would help in assuring compensation for the operation of Units 1 and 2 without cooling towers. (Commentor 61)

Response 75

Please refer to [Response 71](#), [Response 72](#) and [Response 74](#)

Comment 76

A commentor states that resorting to use of the "Replacement Acreage" feature could result in an "easy way out" for avoiding dealing with difficult, important ecological matters. The purchase of land not in need of much marsh restoration work or upland buffer will "miss the mark" in compensating for fish losses. (Commentor 61)

Response 76

As discussed in [Response 48](#) and [Response 72](#), PSEG has informed the Department of its intention to purchase approximately 1000 acres of buffer. PSEG is continuing to restore more than 10,000 acres of wetlands, which is more than the 7,487 minimum number of acres the Department determined was necessary to address losses at the Station. See [Response 79](#). The Department has determined that the acreage required for wetlands restoration is sufficient to minimize the losses at the Salem intake structure. The appropriateness of any replacement acreage and the resulting benefits for fish production will be evaluated at that time if that situation does indeed occur. As stated in [Response 45](#), the permittee is currently in compliance with the vegetative success criteria at all EEP sites.

Comment 77

One commentor states that the restored salt hay farms offer a demonstrated ecological benefit that likely exceeds any potential effects of the Station on populations of fishes and invertebrates in the estuary. (Commentor 71)

Response 77

The Department agrees that restoration of the formerly diked salt hay farms has resulted in a demonstrated beneficial effect on fish populations as well as other ecological benefits. The Department also agrees that restoration of the formerly diked salt hay farms helps to minimize fish effects of the losses at the plant. However, because there are many environmental variables that affect fish production estimates and because restoration at the formerly diked salt hay farms is not yet complete, the Department can not confirm at this time that restoration at the formerly diked salt hay

farms has exceeded the effects of the Station on populations of fishes and invertebrates in the estuary.

Comment 78

The commentor states that the value added to fisheries resulting from *Phragmites* control has proven hard to measure. Better documentation is needed before fish production credit is granted for *Phragmites* control. (Commentor 68)

Response 78

The Department agrees that it is difficult to quantify the value of fish produced in a restored marsh formerly dominated by *Phragmites*. As discussed in further detail in [Response 79](#), the permittee is not required to demonstrate a certain level of fish production but rather is required to restore a requisite acreage of marsh plant types known to provide basic nutrients for production in estuarine environments as specified in item G.3.a. of Part IV of the permit. As discussed in [Response 58](#), the Department has determined that the restoration of *Phragmites*-dominated lands is beneficial for fish production. As described in [Response 9](#), the Department did not designate the wetlands restoration program as best technology available.

Comment 79

Some commentors state that without a clear comparison of entrainment and impingement losses versus production, as a result of wetland restoration and construction of fish ladders, it is difficult to establish whether the special conditions of the NJPDES permit have adequately minimized and compensated for adverse impacts on the aquatic environment. Based on one commentor's estimates of biomass lost due to impingement and entrainment, these losses are considerably higher than the estimates regarding production. Because PSEG should be required to fully compensate for unavoidable losses, it is recommended that additional marsh restoration projects and/or fish ladders be required. Another commentor states that the burden of proof is PSEG's to ensure that the EEP compensates for annual losses due to entrainment and impingement. This commentor also expresses concern about uncertainties with the food chain model and assumptions and coefficients, which were used to calculate how much restoration acreage was necessary. Another commentor suggests that a future biological/ecological evaluation be performed to document the degree to which any compensation or mitigation effect is provided. (Commentors 1, 9, 59, 61)

Response 79

By way of background, the wetlands restoration program is intended to increase fish productivity in the Delaware Estuary. The amount of acreage selected for the program was determined and mandated in the July 20, 1994 permit by determining the amount of *Spartina alterniflora* and other associated plants that would be produced each year and the resulting detrital plant biomass available in Delaware Bay by decomposition by fungi, bacteria and other micro-organisms. These in turn would be consumed by zooplankton and various small invertebrates which forms the food base for fishes. These ecological concepts, along with specific quantities, formed the basis of the aggregated food chain model and was used to translate estimated fish losses at the Station to acres of wetlands required to adequately minimize those losses. Primary productivity per acre of wetlands per year and food chain trophic level conversion factors were derived from published, peer-reviewed scientific literature and were employed in this calculation using information specific to the Delaware Estuary, where available. Conservative assumptions were incorporated in the energy flow through successive trophic levels in the food chain model.

In its July 20, 1994 NJPDES permit, the Department calculated that a minimum of 7,487 acres should be restored to increase fish productivity to a level that equals the fish estimated to be destroyed by the

cooling water intake structure. This amount of acreage was based primarily on the mortality estimates for the bay anchovy because it is bay anchovy mortality, which results in the highest acreage determination. Using the estimates of mortality for weakfish (3.3 million young-of-year), 4,395 acres would be required. Using the mortality estimates for spot (4 million young-of-year), 5,619 acres would be required. Using the mortality estimates for white perch (350,000 adults), approximately 1,247 acres would be required. Using fish mortality estimates for bay anchovy (1,280,304 pounds wet weight), 7,487 acres are required which is the number of acres that the Department used as a basis in the July 20, 1994 Permit. The number of acres required are not additive; therefore, by selecting the largest amount of acreage required for any given species, production of the other species will be increased to levels exceeding that estimated to be destroyed. Thus, while 7,487 acres of *Spartina alterniflora* marsh should offset the losses of bay anchovy, this marsh acreage should more than offset losses for all the other fish species.

Moreover, the Permittee proposed to restore a minimum of 10,000 acres, which provides added insurance that fish production will be increased to sufficient levels to minimize the effect of Salem-related losses. It should be noted that the opossum shrimp are accounted for as a lower trophic (food chain) level food source, and that the restoration of the amount of acreage required for the predatory fishes has already taken opossum shrimp biomass into consideration at the lower trophic level.

PSEG was not required to estimate fish production associated with its wetland restoration sites as part of the July 20, 1994 permit. The Department recognized at that time the many factors, variables and limitations to measuring productivity of the wetland restoration sites and of the fish ladders. On page 45 of the Response to Comments document in the July 20, 1994 NJPDES permit, the Department states:

The Permittee would not be required to demonstrate how many fish of each species have been generated from the restored wetlands. Such a demonstration would not be practicable given the many environmental variables that influence fish populations in the Delaware Estuary. Accordingly, the restoration program does not include fish abundance indices or goals. Rather, the Permittee is required to demonstrate that it has restored the requisite acreage of wetlands from which, based on the best scientific evidence available, it is logical and appropriate to conclude that there will be increased productivity of fish in the Estuary.

The Department required best technology available pursuant to Section 316(b) and then separately, based on the permittee's proposal, incorporated the wetlands restoration conditions and fish ladder conditions. Thus, the permittee's compliance with Section 316(b) does not depend on a certain level of production. Although not required to do so in its July 20, 1994 permit, the permittee voluntarily included production estimates from the formerly diked salt hay farms even though compliance with final success criteria has not yet been achieved at all sites and even though compliance with final success criteria is not required until the dates specified in Response 54. It is also important to understand that production estimates were not assessed for the *Phragmites*-dominated marshes. Therefore, the production estimates were provided for only a portion of the continually evolving EEP sites.

As part of its Biological Monitoring Program PSEG provided extensive analyses on the faunal response to marsh restoration. Considering the restoration sites where restoration activities were first completed, data from the three restored salt hay farms demonstrates that: 1) species richness, species composition, and abundance of marsh fauna at restored salt hay farms are equivalent or comparable to that of reference marshes; 2) habitat for reproduction, feeding and growth are

equivalent for restored salt hay farms and reference marshes; and 3) movement and feeding that occurs in marsh habitats and subsequent seasonal movements provide mechanisms for transferring energy from restored marshes to bay and ocean. Due in part to its review of these analyses and studies, thus far, the Department has determined that the requisite number of acres specified in the permit is appropriate and sufficient so as to minimize the impacts at Salem.

Nonetheless, the Department has required PSEG to support estimates of fish production as a condition of this final permit along with any renewal permit application. Although the Department acknowledges that fish production estimates are subject to many environmental variables, as well as the fact that PSEG is not required to produce a certain number of fish, the Department has included a requirement in G.11.b. that PSEG provide estimates of biomass lost at Salem and biomass produced from the wetlands restoration and fish ladder programs as part of the next renewal application. These estimates may be helpful to the Department assessment of the net environmental effect of Salem's intake effects in the next NJPDES permit renewal cycle.

Comment 80

Some commentors state that recent mitigation has not addressed impacts prior to 1994. Another commentor states that in the absence of cooling towers, compensatory requirements need to be expanded considerably. (Commentors 1, 59, 61)

Response 80

Salem has operated and continues to operate pursuant to validly issued licenses and permits. Moreover, the Department has no authority under the Federal Clean Water Act, the New Jersey Water Pollution Control Act or any other law to impose compensatory requirements, damages or "fines" on the permittee for past fish mortality resulting from cooling water intake structure operations. Please refer to Response 9 regarding the appropriateness of cooling towers and Response 72 and 79 regarding the appropriateness of additional acreage requirements.

Comment 81

One commentor states that only after all practicable measures have been implemented to avoid and minimize impacts, is it appropriate to consider other means for compensating for remaining impacts such as the proposed wetland restoration plan and fish ladders, provided they adequately compensate for adverse impacts. (Commentor 1)

Response 81

As articulated in its December 8, 2000 draft permit, the Department has evaluated all available intake protection technologies as well as the associated cost benefit ratios for each technology. As a result of this evaluation, the Department has determined that a continued intake flow limit, continued use of the modified Ristroph intake screens, further improvements to the fish return system and the study of a multi-sensory hybrid system constitutes best technology available in accordance with Section 316(b) of the Clean Water Act. The wetlands restoration program was a voluntary measure proposed by the permittee as discussed in Response 9. Please refer to Response 79 regarding the Department's position as to whether the wetlands restoration conditions compensate for the losses at the intake.

Comment 82

A few commentors state that PSEG should be required to provide production estimates from the marshes as required by NJDEP in the permit. (Commentor 1, 61, 119)

Response 82

The Department agrees with this comment and has required the permittee to provide such production estimates as item 12.b.i. of Part IV of the final permit. See justification set forth in Response 79.

Comment 83

Many commentors state that the proposed permit and mitigation actions do not compensate the ecosystem for damage done. One commentor states that not one scientist that spoke at the January 25, 2001 hearing acknowledged any relationship between the increased production to the estuary created by the EEP and the losses at the plant. Other commentors express skepticism that the marshes are actually producing fish. Another commentor states that based on recent research, it is unlikely that marsh restoration could compensate for the fish lost at the plant. Another commentor states that even if the marshes were successful at producing fish, they would just be killed at the plant. Because NJDEP admits that it is not practicable to try and demonstrate the number of fish that are benefited by the wetland restoration effort, there can be no support for statements that the wetlands are benefiting fish populations. Another commentor states that debate revolves around the number of fish the wetlands will produce. An internal NJDEP memo written by the Project Manager in 1989 indicated only a small fraction of fish would be produced by restoring wetlands and that 24,000 acres of restored wetlands would only produce approximately 1% of the weakfish killed by the plant. In comparison, PSEG's model estimates that 10,000 acres will make three times more fish than what is killed. (Commentors 2, 65, 68, 85, 105, 117, 118)

Response 83

Please refer to Response 79 regarding the Department's position on the wetlands restoration conditions and any mitigation effect.

The Department disagrees with the statements in these comments that contend that wetlands restoration conditions do not enhance fish production. As summarized in Comment 26, there is scientific research and literature to support the position that wetlands are essential for fish production. Basic science supports the fact that wetlands are important sources of energy necessary for fish production. As stated in the July 20, 1994 permit, scientific literature and the Department's experience establish a clear relationship between the amount of salt marsh available (in terms of a source of food and living space) and increased fish productivity. Sufficient scientific information exists to support a direct relationship between the amount of salt marsh, vegetative matter produced, and the production of fish in Delaware Bay. This relationship was used to establish the requisite number of acres necessary for restoration as described in Response 79.

Mitigation is one of the alternatives that is currently being considered by EPA Headquarters as part of its Section 316(b) rule-making for existing facilities. As indicated in Table 1 entitled "Estimated Relationship Between Facility Flow and Restoration Project Size" in the draft document entitled "Draft Initial Cost Estimates" prepared by USEPA Office of Science and Technology in May 2001, EPA has established a relationship between the intake flow as a source of fish mortality and the requisite number of acreage required to be restored. Therefore, EPA Headquarters has established a relationship between intake flows and the number of acres needed to be restored, even if it is still on a draft basis.

The Department acknowledges that a small percent of the increased production from the restored wetlands and fish ladders may be carried to the cooling water intake structures and destroyed by impingement or entrainment. However, the conservative approach used by the Department in calculating the amount of wetlands acreage required for restoration, and the approximately 2500

additional acres required beyond the conservatives estimates, are expected to adequately address the potential number of fish that may be lost at the plant.

Regarding the statement concerning the 1989 memo referenced in this comment, the wetlands restoration program incorporated in the July 20, 1994 permit and retained in this final permit is completely different than that considered by the Department in 1988 and 1989. The wetlands calculation considered in the referenced memo employed unsupported assumptions regarding wetland productivity. Furthermore, the 1988-1989 plan was at a very preliminary stage in its development. Subsequent to that time, the Department collected and reviewed available scientific peer-reviewed literature on marsh productivity, marsh restoration and links to fish productivity. The Department based its calculation of the number of acres required on values derived from these sources as described in Response 79.

The Department agrees that ecosystems are complex and as a result of this complexity, it can be difficult to quantify the amount of fish produced in a restored marsh. However, this does not negate the fact that marshes are beneficial to the production of fish populations.

Comment 84

One commentor states that it is premature to make estimates regarding production of juvenile herring resulting from fish ladder installation as PSEG has done. The important fact is that the installation of fish ladders can lead to the establishment of successful runs of river herring hence increasing the production of river herring. This will allow additional forage for predator populations and contribute to recreational and commercial fisheries. (Commentor 1)

Response 84

The Department agrees with these comments. It is noted that PSEG voluntarily provided production estimates for the fish ladders even though these estimates were not required as a condition of the July 20, 1994 permit.

Comment 85

Some commentors state that the information in the application clearly demonstrates that Salem's operations have not and will not adversely affect aquatic resources in the Delaware Estuary and that PSEG has complied with its existing permit. Another commentor states that claims of adverse effects of the facility have been proven wrong not just by PSEG, but by world renowned experts. (Commentors 58, 71, 80)

Response 85

The Department does agree that PSEG is currently in compliance with all conditions of its July 20, 1994 permit.

The Department and other states, such as New York, maintain that for Section 316(b) purposes any impingement or entrainment effects are considered an "adverse environmental impact" which must be minimized through available technologies under Section 316(b). Based on this legal position, the Department has determined that it is justified in requiring the pursuit of alternate intake protection technologies to further minimize the impacts at the Salem Station. In view of this legal position, the Department does not agree that Salem's operations do not adversely impact the Delaware Estuary. See also Response 92. Conversely, PSEG's position is that "adverse environmental impact", as used in Section 316(b), is intended to address impacts only at population levels or above where determinations of an impact must be made on a case-by-case basis.

Given the divergent on appropriate definitions of adverse environmental impact (AEI) for 316(b), and the lack of a definition from EPA, the Department believes no useful purpose would be served by its entering into a technical debate on the definition of AEI as part of its permitting decision regarding Salem. Rather, the Department re-affirms its regulatory position that any impingement or entrainment effects are an “adverse environmental impact” which must be minimized through available technologies under Section 316(b).

EPA Headquarters has recently proposed rules in draft form for Section 316(b) for Cooling Water Intake Structures for new facilities. These proposed rules specifically state that “The regulatory language in today’s proposed rule does not include a definition of adverse environmental impact.” In its comments dated November 9, 2000 on this rule, the Department strongly recommended that EPA Headquarters include a definition of adverse environmental impact and suggested that “adverse environmental impact” be defined as “any impingement or entrainment of aquatic organisms”. Without this definition of adverse environmental impact, it is the Department’s opinion that the permitting authority would first have to prove that there is an adverse impact to representative important species before requiring any analysis of technologies and their costs and benefits. Without a precise and unambiguous definition, state agencies and permitting authorities could potentially engage in a debate for years as to the population measure of a given fish species, let alone many fish species. The results of biological population studies and modeling can be very subjective because it is difficult to identify, measure, and attribute the impact of each of the many variables (i.e. multiple facilities, coast wide trends, and climate changes) affecting populations of each of the impacted species. Rather than engage in this kind of biological debate, time and resources would be better spent focusing on the magnitude of the impingement and entrainment losses in relation to the costs and benefits of implementing various technologies to avoid or minimize the impact. This focus is appropriate for Section 316(b), which the Department interprets as a technology-driven provision.

Comment 86

Some commentors do not accept PSEG’s contention that the current once-through cooling water system has “no significant impact” on the Delaware Estuary. Another commentor states that without data to separate the abiotic and biotic factors that influence a fish population (such as water quality, weather and recreational/commercial harvest), PSEG’s presumption that the “direct effects of the Station on Representative Important Species (RIS) populations are very small” is tenuous at best. Another commentor states that PSEG’s contention regarding adverse impact is unrealistic since PSEG contends that a decline to “total or global populations” of large scale, wide-ranging fish populations in open ecosystems must occur before there is an adverse impact. One commentor suggests that a thorough biological/ecological evaluation of the term adverse environmental impact be considered in the future. (Commentors 1, 9, 59, 65, 68)

Response 86

Please refer to Response 85.

Comment 87

One commentor states that Salem is having an adverse impact. It is encouraging that neither the State nor ESSA adopted PSEG’s self-serving analyses that suggested that Salem was not having an adverse impact since water quality improvements and fishery management plans were supporting increasing fishery population trends. Another commentor states that Salem is having an adverse impact, and the proposed permit does not minimize such impacts (Commentor 67, 68)

Response 87

Please refer to Response 85 regarding NJDEP's determination of "adverse environmental impact." The Department has determined that the best technology has been imposed to minimize adverse environmental impact and additionally, the wetlands restoration and fish ladder requirements adequately minimize the effects of Salem's intake structure. Please refer to Response 88 regarding the Department's determination concerning the status of fish populations.

Comment 88

These two commentors state that based on a variety of data including New Jersey and Delaware biological survey data, fish populations are increasing for 7 of the 9 representative important species, 1 indicates no clear trend, and 1 is decreasing, although it was decreasing prior to Salem's operations. Newly available assessments for striped bass and weakfish from the Atlantic States Marine Fisheries Commission show significant increases in spawning adults for these species. (Commentors 34, 71)

Response 88

In its March 4, 1999 NJPDES application, PSEG included information regarding the trends (percent change) in relative abundance per year of age 0 fish for the DNREC's Juvenile Trawl survey, PSEG's Nearfield Bottom Trawl survey and for all ages collected for NJDEP's Beach Seine Program. Based on this data, statistically significant increases and relative abundance (ranging across all species from 7.3% to 3610.3%) are evident for Alewife (DNREC and PSEG); American Shad (NJDEP); Atlantic Croaker (PSEG); Bay Anchovy (NJDEP); Striped Bass (DNREC and NJDEP); Weakfish (DNREC, NJDEP and PSEG); and Blue Crab (DNREC). Statistically significant decreases (ranging across all species from 2.4% to 8.1%) are evident for Blueback Herring (DNREC and NJDEP); Spot (DNREC and NJDEP) and Bay Anchovy (PSEG). For some of the species in some of the sampling programs the index of abundance was not calculated. Therefore, based on this data, the Department agrees that fish populations are increasing for 7 of the 9 representative important species, 1 indicates no clear trend, and 1 is decreasing, although it was decreasing prior to Salem's operations. The Department also agrees that newly available assessments for striped bass and weakfish from the ASMFC show significant increases in spawning adults for these species.

Comment 89

Another commentor states that based on anecdotal evidence, wildlife and fish populations are not the same as years ago. (Commentor 95)

Response 89

Please refer to Response 88 regarding the status of fish populations.

Comment 90

Many commentors state that the losses due to impingement and entrainment at Salem are cause for concern. One commentor states that the losses due to impingement and entrainment are significant and estimates that the combined total of finfish and blue crab losses is estimated at 2.9 million kilograms per year which include commercial and recreational non-RIS and non-RIS forage fish. Another commentor states that Salem is located in a major nursery area for estuarine and marine fishery resources and as a result there have been two decades of losses due to impingement and entrainment. One commentor states that PSEG should be considered another participant in the Delaware fishery and should be fined for violation of bag and size limits for the fishes it takes from the Bay through entrainment and entrapment. Similarly, other commentors state that if an individual fisherman's catch is considered of impact, clearly the massive destruction of one industry must be considered as a takings. Another commentor states that NJDEP should take into account the amount

of managed fish that are killed in the Salem cooling process in making a decision on the Salem NJPDES permit. One commentor states that the impacts are staggering resulting in the loss of life at every trophic level where these adverse effects occur 24 hours a day, 7 days a week, 365 days a year, year after year. This commentor states that it is estimated that 3 billion fish are lost annually at Salem where this figure only considers the Representative Important Species. (Commentors 1, 51, 60, 61, 64, 65, 68, 69, 70, 86, 92, 94, 98, 99, 103, 118, 119, 121, 122)

Response 90

The Department agrees that there are significant impingement and entrainment losses at Salem. These losses were considered in the cost-benefit analysis for various intake protection technologies as described in Response 22. Further detail regarding entrainment losses is included in Response 126.

There are various fishery restrictions that apply to fisherman which may include bag and size limits, whereas the Clean Water Act (CWA) is the relevant regulation for facilities that withdraw surface water such as Salem. Given the numerous conditions imposed in the July 20, 1994 permit as well as in this final permit, Salem has been required to implement a number of measures to reduce its impacts. The Department has determined that Salem is in compliance with the CWA provided it complies with the terms and conditions of its NJPDES permit.

The Department agrees that Salem withdraws intake water throughout the year although intake flows can be significantly reduced during certain operating conditions. Specifically, intake flow reductions may occur during a refueling outage as well as during an extended outage such as that which occurred from May 1995 through April 1998 for Unit 1 and from June 1995 through August 1997 for Unit 2.

Impingement and entrainment monitoring is regularly performed where all species impinged and entrained are reported including non-RIS species. The results of this monitoring are included in the annual reports of the Biological Monitoring Program which are submitted to the Department. Losses for non-RIS species were also factored into the cost/benefit analysis for various intake protection technologies.

Comment 91

Some commentors note that the 2000 ESSA report states that PSEG greatly underestimated its impacts on Delaware Bay fish and that actual losses are at least 2.2 times greater than what is listed by PSEG. Another commentor states that the ESSA report calculates the total biomass of fish lost to the ecosystem as being 8.5 million pounds of commercial species lost which is 2.2 times higher than listed in the permit application. (Commentors 65, 68, 69, 119)

Response 91

ESSA's statement has been taken out of context, and as a result, their statement has been misinterpreted. On page 75 of the ESSA Report, ESSA evaluates PSEG's Production and Catch foregone analysis from four main perspectives and itemizes statements reflecting upon each of these four points. ESSA then states "Points 1 to 3 mean that the actual total biomass of fish lost to the ecosystem (including fisheries, station losses and losses of food to predators, summed over all species) is at least 2.2 times greater than that listed in the application". PSEG did not present any estimates of "total biomass of fish lost to the ecosystem"; rather PSEG presented estimates of pounds lost to the fishery as part of its cost/benefit evaluation of technology alternatives. ESSA's statement does not address the validity of PSEG's estimates of pounds lost to the fishery.

ESSA was suggesting that if the loss analysis were to be considered from a different perspective, the alternative measure would be a bigger number than the measure used in the PSEG analysis. It is important to distinguish that, while the analysis submitted by PSEG contained multiple conservative assumptions, ESSA is suggesting an alternative and even more conservative method for conducting a very complex fishery loss analysis. However, ESSA did not elaborate on how the alternative measure should be used in the cost/benefit evaluation of technology alternatives. Furthermore, USEPA guidance does not currently exist in final form as to how to conduct such a loss analysis.

The cost/benefit ratios were developed considering a “base case” set of operating conditions and resulting losses. The costs and benefits for the various intake protection technologies were evaluated considering this base case set of conditions. The Department has determined that the base-case scenario, for which the cost-benefit ratios were developed from, included many layers of conservatism. Therefore, the Department has determined that the base-case loss analysis, and resulting cost/benefit ratios for which the intake protection technologies were evaluated, is sufficient for the purposes of its NJPDES permit decision.

Comment 92

One commentor states that it is not clear what the Department’s findings are with respect to the overall effect of the fish losses at Salem, although there is complexity involved in such an analysis. The public would be well served if the Department developed a summary of the plant’s impacts, including an explanation of trends in fish losses, where the Department should seek to address the reasons for the increased mortality figures. (Commentor 69)

Response 92

The Department agrees that defining losses is inherently complex where some methods provide a more conservative result than others. By way of background, PSEG provided loss estimates in its application in the following ways:

- Impingement and entrainment losses - expressed in losses (number of fish) and densities (number/million m³)
- Conditional Mortality Rates (CMR’s) – CMR values provide a conservative estimate of the percentage reduction in the Delaware portion of the young-of-the-year populations due to Salem’s operations without taking into account compensation or the portion of the population that resides outside the study area (RKM 0 – 117) within the Delaware.
- Base Case Losses - impingement and entrainment losses were calculated for a consistent set of operating conditions and losses were converted to age 1 equivalent recruits. The alternate intake protection technologies were defined in terms of base case losses.
- Production Foregone - estimates the total reduction in future growth (measured in units of biomass) attributable to organisms killed as a result of impingement and entrainment at the station. This analysis was included for the forage fish bay anchovy and for non-RIS forage species and this analysis fed into the cost/benefit assessment.
- Spawning Stock Biomass per Recruit (SSBPR) – this model considers the reproductive capacities of organisms entrained and impinged by estimating the fractional change in reproductive capacity of a given species as a result of plant operations.
- Equilibrium Spawner Recruit Analysis (ESRA) – this model is used to understand long-term (equilibrium) impacts by calculating the population consequences of base-case conditional mortality rates for entrainment and impingement.

An illustration of the interdependence of data and analyses in the March 4, 1999 application is included as Attachment 2. This figure was taken from the June 14, 2000 ESSA Report. It is the

Department's position that the best starting point to understanding Salem's effects on the Delaware Estuary is to refer to impingement and entrainment data sets. These numbers reflect the direct effects at the Station due to impingement and entrainment although, as discussed in [Response 93](#), the natural rate of biological attrition is typically high for entrainable sized organisms. An assessment of these effects is integral to defining alternatives to minimize these losses. Impingement and entrainment data sets feed directly into the Base Case losses where the Base Case losses were used in defining alternative intake protection technologies and their associated cost/benefit ratios.

Another useful way to understand Salem's effects is through conditional mortality rates, which is a method to understand the effects of impingement and entrainment on fish populations. Available CMR estimates from the March 4, 1999 application have been included as [Attachment 3A](#). In addition, [Attachment 3B](#) contains a listing of the models that were used to estimate the CMR's. It is important to note that CMR's may provide a conservative estimate of effects, since they do not consider biological compensatory mechanisms.

The Department does not rely on the status of fish populations in defining adverse environmental impact as discussed in [Response 85](#). Nonetheless, it is important to note that the empirical data on fish abundance from three long-term biological sampling programs, two of which are performed by New Jersey and Delaware, show increasing populations for most Representative Important Species (RIS) species in the Delaware Estuary. Higher impingement/entrainment losses for a recent year appear to be proportionate to greater populations in the receiving waterbody (i.e. Delaware Estuary). Salem's intake and discharge volumes have remained relatively constant from the onset of its operations with the exception of significantly reduced volumes during outages.

From a national perspective, Salem is unique in that it has extensive historical impingement and entrainment data, ongoing impingement and entrainment data collection, a comprehensive loss analysis; several Section 316(a) demonstrations establishing the maintenance of a balanced indigenous population; several Section 316(b) demonstrations; and technological studies regarding alternate intake protection technologies. As illustrated in Table 12 (included as [Attachment 4](#)) entitled "Estimated Distribution of Number of Facilities Having Conducted an Environmental Technology Study by Industry Group", only 61.5% of traditional utilities have any discrete or on-going impingement and entrainment data sets; Section 316(b) demonstrations; or technological studies. Again, this table was distributed at the May 23, 2001 EPA "Technical Experts Panel for Section 316(b)" as a summary of a survey conducted in January 2000. Therefore, the Department has determined that is reasonable to state that the effects of Salem are well documented as compared to other utilities in the nation.

Comment 93

One commentor states that the mortality of aquatic organisms by the plant are for the most part early life stages and 97% would die from natural causes before their first birthday. Another commentor states that fish eggs and larvae that are taken into the Salem intake reach a 99% rate of attrition. (Commentors 71, 80)

Response 93

The Department agrees that entrainment is the primary mode of impact for aquatic organisms at the plant and agrees that the natural rate of biological attrition is typically high for entrainable sized organisms. However, this does not preclude the Department from considering these losses in defining an impact. The Department considers entrainment and/or impingement to be an environmental impact and then assesses the magnitude of the impact as described in [Response 22](#).

Comment 94

One commentor states that the statements by PSEG that the killing of juvenile fish on the grounds that they are going to die naturally at some point of their life cycle is unsupportable. Death from impingement and entrainment is not equivalent to the natural pressures of the environment and many that die are not utilized by consumption but by microbial breakdown. Dr. Lauer's 1993 testimony incorporates nine figures on juvenile fish abundance from 1980 to 1992. He draws a conclusion that the intake system of the power plant has no adverse affect on the fish populations and that changes in populations are due to yearly fluctuations. That conclusion can not be drawn from this information because these figures provide no information on the juvenile fish abundance "before" the power plant began operation. Why did PSEG omit the fish abundance information before 1980?

Response 94

The Department agrees that all losses need to be considered in any loss analysis. Losses of juvenile fish due to impingement and entrainment were considered in the loss analysis and subsequently considered in the cost/benefit analysis.

In response to the comment regarding Dr. Lauer's testimony from the 1993 proceeding, PSEG's March 4, 1999 application presented trends information (this information is summarized in Response 88) for selected fish species from 1980 through 1998 covering the majority of the time when both Salem units have operated (i.e., Salem Unit 1 began operation in 1978 and Unit 2 in 1981). Consistent data were not collected from the various sampling programs prior to that date and therefore could not be included in the analyses. The conclusion PSEG drew in the March 4, 1999 application from the trends analyses was that the data show no evidence of a continuing decline in the abundance of most juvenile finfish RIS. In fact, PSEG contends that the data provide positive evidence of increases in the abundance of seven of nine juvenile finfish species. As stated in the March 4, 1999 application, the trends analyses were used only to characterize the empirical trends in abundance of age-0 RIS fish for the period of record.

Comment 95

One commentor states that the biological compensation analyses included in PSEG's application is unacceptable for many reasons. No growth in population has been demonstrated by PSEG. No measurable evidence of biological compensation was presented. In fact the opposite may be occurring. Specifically, not only does the intake kill small fish, but it also kills the food source for these fish since billions of microscopic plants and animals are drawn through the cooling system and killed. (Commentor 65)

Response 95

Biological compensation is a biological principal that is used in many fisheries analyses. PSEG performed a biological compensation analysis to support the "Cumulative Effects" assessment included as Appendix H of PSEG's March 4, 1999 application. PSEG included Appendix H to illustrate its findings with respect to the effects of the plant on a coast-wide or estuary-wide basis. The Department did not rely on Appendix H in evaluating available intake protection technologies and their associated cost/benefit ratios. Therefore, the Department did not consider the effects of biological compensation in its analysis of alternative impingement protection technologies. Please refer to Attachment 5 for an illustration of the relation of Appendix H to the Section 316(b) analysis (Appendix F) from which the cost/benefit ratios were established. Attachment 5 is from the March 4, 1999 NJPDES application. Please refer to Response 88 regarding the status of Delaware River fish populations.

Comment 96

Several commentors expressed specific concern about entrainment losses at Salem. One commentor estimates that entrainment losses exceed impingement losses by 39 to 1. (Commentors 1, 61, 65, 67, 68, 85, 103)

Response 96

Refer to Response 93 and Response 126.

Comment 97

One commentor states that NJDEP should oppose the proposed permit renewal since it fails to comply with Section 7 of the Endangered Species Act, and the Essential Fish Habitat requirements under the Magnuson-Stevens Fishery Conservation and Management Act. Another commentor requests that an Essential Fish Habitat Analysis be submitted since the cooling water intake and outflow of Salem lies within the mixing zone of the Delaware Estuary, making it essential fish habitat for winter flounder, windowpane flounder, bluefish, Atlantic sea herring, summer flounder, scup and black sea bass. (Commentors 51, 65)

Response 97

The Department disagrees with this commentor's contention that Salem does not comply with the Endangered Species Act. The NJPDES Permit for Salem incorporates by reference the terms of Salem's Nuclear Regulatory Commission (NRC) operating license as item 14.d of Part IV. Section 7 of the Endangered Species Act, 16 U.S.C. 1531 et seq., requires federal agencies, including the NRC, "to insure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat of such species...". On January 2, 1991, the National Marine Fisheries Service (NMFS) issued Salem a "no jeopardy" determination. On May 14, 1993, NMFS issued a second "No Jeopardy" opinion finding that the stations (Salem and Hope Creek) are not likely to jeopardize the continued existence of any listed species. Please refer to Response 98 for further information.

Regarding the statement that the mixing zone associated with Salem is essential fish habitat (EFH) for winter flounder, windowpane flounder, bluefish, Atlantic sea herring, summer flounder, scup and black sea bass, the Department maintains that Salem has a minimal effect with these species based on a review of impingement and entrainment raw data as well as a review of the surveys conducted in the Delaware on relative abundance of fish. The total number of fish of these managed species that have been collected annually at Salem in impingement samples is very low ranging from 0 in some years for some species (e.g., Atlantic butterfish, Atlantic sea herring, black sea bass, scup, windowpane) up to 104 for Atlantic sea herring in one year. Similarly, the total number of fish of these managed species that have been collected annually in entrainment samples is extremely low ranging from 0 for most species in most years to 46 for summer flounder in 2000. The Department believes a further EFH assessment may not be needed, based on the 1995 through 2000 Salem impingement and entrainment data and the life history information that indicates that most life stages of the managed species of concern have little potential for involvement with the Station.

Nonetheless, the Department will pursue this issue and the potential need for an EFH Analysis for Salem with the National Oceanic Atmospheric Administration (Commentor 51) as requested. It is important to note that Commentor 51 did not suggest that the Department should delay or reconsider issuance of its NJPDES permit pending submission of the Essential Fish Habitat Analysis.

Comment 98

Some commentors suggest that Salem has had an adverse impact on endangered species such as sea turtles and shortnose sturgeon. One commentor states that coincident with the Marine Mammal Stranding Center being no longer involved with turtles that are impinged at the station, the number of turtles impinged dropped to one per year with nothing wrong with them. In comparison, from 1977 to 1992, 86 sea turtles were impinged, and 31 of them died. The Marine Mammal Stranding Center should be notified and oversee any impingement of sea turtles. In 1992 Salem killed 2 short-nosed sturgeon but none of the proposals in the draft permit address the issues of endangered species and how to minimize the impact on them. The entrapment and death of endangered species should be considered harassment as specified by the Endangered Species Act because BTA is not being utilized. Another commentor states that because Salem has historically taken sea turtles and shortnose sturgeon, the permit should require PSEG to track this information. (Commentors 65, 68, 119).

Response 98

Data from Salem indicate that Station operations are not having adverse effects on sea turtles or shortnose sturgeon. This conclusion is confirmed by numerous government-issued "no jeopardy" determinations for endangered and threatened species under the Endangered Species Act. In 1990 PSEG entered into a formal endangered Species Act section 7 consultation with both the National Marine Fisheries Service (NMFS) and the US Nuclear Regulatory Commission that resulted in a "no jeopardy" determination on the sea turtle losses through 1988 (NMFS 1991).

The US Nuclear Regulatory Commission (USNRC) has integrated the requirements of the NMFS Section 7 determination of "no jeopardy" and concomitant requirements into the Facility Operating License. The permittee is required to comply with Section 4.2 of Appendix B to the NRC Facility Operating Licenses Nos. DPR-70 and DPR-75, which includes NMFS Section 7 Consultation (item G.14 of Part IV of this final permit) in regard to the effects of Salem on threatened and endangered species. On January 2, 1991, NMFS issued Salem a "no jeopardy" determination for all the species listed in the comment. On May 14, 1993, NMFS issued a second "No Jeopardy" opinion finding that the Stations (Salem and Hope Creek) are not likely to jeopardize the continued existence of any list species. Based on the NMFS finding of "no jeopardy" to the listed species from Salem's operation it is not warranted for the Department to require additional conditions.

Regarding sea turtles, PSEG is required under item 14.d. of Part IV of its permit to notify the NMFS of any capture of sea turtles. In addition to the NMFS, PSEG is required to notify the NRC, the Department and the Marine Mammal Stranding Center. Station personnel handle the release of the animal with a veterinarian that specialize in exotic animals. Turtles that are healthy are returned to the Delaware Bay approximately five miles away from the Station.

Sea turtle losses have significantly decreased since 1988. This is due to administrative controls; frequent cleaning of the trash racks, when turtles are likely to appear in the Estuary; and removal of the ice barriers during non-winter months reducing mortality of sea turtles captured at the intake. By 1991 sea turtle release rates had increased to 96 percent (NMFS 1992).

When PSEG moved from an "informal consultation" with NMFS to a "formal consultation" in 1990, PSEG record keeping became a regulatory obligation. At this time NMFS also imposed a requirement for tracking of turtles with sonic and satellite tracking equipment. Because of the nature of these regulatory obligations, PSEG did not want to rely on another organization to fulfill its obligations to NMFS.

Regarding shortnose sturgeon, a total of 13 shortnose sturgeon were collected from the Salem CWIS during 1978 through 2000. The total number of sturgeon collected annually ranged from zero in most years up to 3 in two years (1991, 1998). Since 1994, a total of 7 sturgeon were collected and 3 of these were returned live to the Delaware.

As indicated in item G.14. of Part IV of the final permit. PSEG is required to report any information related to Salem's effects on threatened and endangered species to the NMFS and the Department.

Comment 99

One commentor states that PSEG adversely impacts the environment particularly with respect to horseshoe crabs. Because horseshoe crabs are not one of the agreed upon species being monitored by PSEG, it is not known how many horseshoe crabs the plant is killing. (Commentor 53)

Response 99

The Department does not agree. Horseshoe crabs are typically found in lower, more saline portions of Delaware Bay and are not usually found in the vicinity of Salem. In addition, as part of its routine impingement sampling, all impinged organisms (including non-RIS) are monitored and reported as part of the Biological Monitoring Program Annual Reports that are submitted to the Department. The Department has reviewed these reports and found that no horseshoe crabs have been impinged or entrained at Salem based on 1995 through 1999 raw data.

It is important to note that as a result of the EEP, horseshoe crab habitat has actually increased since more land area is now accessible to horseshoe crabs, namely the MRT, Commercial and Dennis sites.

Comment 100

One commentor states that the permit ignores the cumulative effects of the intake structure of other facilities in the Delaware Estuary in determining how much minimizing need occur. Citing a decision by the Regional Administrator in Brunswick I as well as Congress requiring best technology to minimize impact at all plants, it is evident that Section 316(b) requires consideration of the impacts of all intake structures on a source waterbody. (Commentor 67)

Response 100

The Department evaluates all cooling water intake structures for Section 316(b) issues as part of its regular NJPDES permit review. Therefore, the Department does not agree that it does not consider the impacts of other intake structures on a source waterbody. Moreover, PSEG's application included a trend analysis that reports on the status of the populations, which includes stressors such as multiple intakes from power plants. Based on the information that it has to date and existing regulations, the Department does not agree that Section 316(b) requires consideration for the effects of other intakes from power plants.

The bay-wide impacts of all intake structures on the Delaware Bay are reflected in the ongoing impingement and entrainment monitoring, continued bay-wide biological monitoring and specific technology study requirements such as the multi-sensory hybrid intake protection technology that is required in the final permit.

Comment 101

The commentor suggests that more emphasis should be placed on calculation of production foregone, including those of non-representative important prey species. An effective method for PSEG to

partake in the monitoring of fish production in the Delaware River is to contribute to American shad, striped bass and other important fish stock assessments. (Commentor 61)

Response 101

The Department has required additional analyses with respect to production foregone as item G.8.a. of Part IV as this commentor has suggested. The Department recognizes that PSEG has agreed to fund certain biological monitoring studies through its June 2001 settlement agreement with DNREC. Please refer to Response 135 regarding the participation of PSEG in other stock assessments or biological monitoring.

Comment 102

Some commentors note that to NJDEP's credit, it took the advice of many outside agencies and hired a consultant to review PSEG's voluminous application. Another commentor commends NJDEP for a thorough review of the application as conducted by ESSA. This commentor supports re-analysis of fisheries data and other analyses and suggests distribution of any re-analysis to MAC members and interested parties. (Commentors 61, 68, 119)

Response 102

ESSA performed a detailed review of discrete components of PSEG's application identified in the Scope of Work. Specifically, ESSA's review included impingement and entrainment impacts, available intake protection technologies, cost/benefit analysis and the status of fish populations (e.g. predictive and retrospective assessments of power plant impacts to fisheries, biostatistics, fish population dynamics, and fisheries economics) in the Delaware Estuary. ESSA made a number of recommendations in its report. This report was included in its entirety as Attachment A of the December 8, 2000 draft permit. The Department included the majority of ESSA's recommendations regarding fisheries data and analyses (i.e., impingement and entrainment loss estimates, and catch and production foregone) as NJPDES permit conditions. All re-analysis submitted as part of these NJPDES requirements will be available for public review in the Department's Central File Room, located at 401 East State Street, Trenton, NJ.

Comment 103

The commentor states that PSEG should address each of the concerns and suggestions raised by ESSA and should be given a reasonable amount of time to submit a revised application. The revised application should include greater emphasis on estimating the uncertainty associated with the loss estimates, particularly with respect to entrainment losses and conditional mortality rates. (Commentor 62)

Response 103

The Department has determined that it is appropriate for PSEG to supplement the Administrative Record with additional information and analyses during the term of this final permit. As such, the majority of ESSA's recommendations regarding fisheries data and analyses (i.e., impingement and entrainment loss estimates, and catch and production foregone) have been included in the final permit with schedules as to when the analyses shall be submitted. The Department also agrees with this commentor's specific concern regarding uncertainty associated with the loss estimates and has required PSEG to perform such an analysis as item G.8.b.i. of Part IV. However, the Department does not agree that it is necessary for PSEG to submit a revised application. The Department determined that the existing March 4, 1999 application and subsequent submittals were sufficient for the Department to prepare this final permit.

Comment 104

Several commentors note ESSA's criticisms of PSEG's application as contained in the ESSA report. One commentor states that NJDEP should take to heart the ESSA comments on the application. Another commentor states that the ESSA report condemns PSEG's scientists for "a tendency to draw conclusions that are not supported by the information presented." In particular there is a tendency to draw subjective and unsupported conclusions about the importance of Salem's impact on RIS finfish species. This commentor also states that the ESSA report found that PSEG misrepresented their findings and damage, that PSEG's assertions and findings resulted in biased and misleading conclusions, and that there were inaccuracies and gaps in PSEG's data. (Commentor 64, 65, 68, 119, 121)

Response 104

As stated in Response 103, the Department has incorporated the majority of ESSA's recommendations as to how to improve the data and analyses verbatim as conditions of a renewal permit. Therefore, the Department has appropriately considered the ESSA comments on the application. As part of its review, the Department evaluated the technical data and analyses included in the application, in consideration of ESSA's comments, and found the information in the application sufficient on which to base its final permit. The Department did not consider subjective conclusions or opinions by PSEG as contained in its application in making its technical determination. Please refer to Response 85 and 92 regarding the Department's position on Salem's impact.

Comment 105

One commentor suggests that further analysis of entrainment losses should be pursued. A specific requirement should be included to address PSEG's lack of a Conditional Mortality Rate (CMR) estimate for striped bass entrainment. (Commentor 61)

Response 105

The Department agrees. The Department has required improved entrainment monitoring as item G.7 as well as further analyses of entrainment losses as items G.8 and G.9.b. of Part IV. The Department has also included a requirement in the final permit that requires PSEG to provide an entrainment CMR estimate as part of any renewal application in item 12.c. of Part IV, as well as for other finfish Representative Important Species, subject to data availability. Please refer to Response 92 for an explanation concerning CMR.

Comment 106

The commentor states that it was ironic that 1996 is one of the only years (during a plant shut-down) that a comprehensive set of fishery sets is available for CMR estimates. (Commentor 119)

Response 106

The Department agrees that it is unfortunate that one of the most comprehensive CMR data sets is available for a year in which the plant was in an extended shut-down period. However, it is important to understand that PSEG presented its loss analysis in many ways as described in Response 92. The CMR data did not feed into the intake protection technologies and associated cost/benefit estimates and therefore was unaffected by the lack of CMR estimates. The CMR estimates did however feed into Appendix H, as described in Response 95. Appendix H was not considered in the Department's evaluation of intake protection technologies or their associated cost-benefit ratios.

Comment 107

The commentor states that PSEG's fish calculations seriously understate the impacts of the facility. This commentor cites several examples of these understatements for species such as weakfish and

striped bass. Because of the lack of CMR for striped bass, striped bass losses were not included in the cost/benefit analyses for alternate intake protection technologies and therefore the benefits were understated. (Commentor 68)

Response 107

Please refer to Response 91 regarding the Department's determination with respect to the loss estimates. As stated above in Response 106, the lack of CMR for striped bass entrainment did not affect the cost/benefit ratios for the intake protection technologies.

Comment 108

One commentor states that ESSA noted a high degree of sampling error or bias in the sampling methodology for the PSEG Trends Analysis where the sampling programs often changed in location, timing and methods of sampling. This commentor also notes problems with PSEG's entrainment data sets as identified by ESSA. (Commentor 119)

Response 108

The trends analysis was performed to foster an understanding of the fish population trends in the Delaware Estuary. This analysis also fed into the Appendix H analysis as described in Response 95 and was utilized in the Section 316(b) determination. As noted in Response 92 two of the three long-term data sets used in the PSEG trends analyses are from monitoring programs performed by the states. These data sets are used by state resource agencies for tracking abundance trends of estuarine fish populations. Therefore, it was appropriate for PSEG to include these data sets in its trends analyses.

In an effort to improve upon PSEG's data sets in the future, the Department has required improved biological monitoring as item G.6.a. of Part IV of this final permit which specifically includes improved bay-wide biological monitoring. The Department recognizes that improvements are needed for the entrainment data sets. As such, the Department required improved entrainment monitoring in item G.7. and an expansion of the entrainment analyses as items G.8.b. and G.9.b. of Part IV.

Comment 109

The commentor states that Congress, by enacting 316(b), and EPA, in interpreting it, clearly intend for the overall population impacts to be rectified by technology which prevents the specific impingement and entrainment harms caused by cooling water intake structures. This commentor cites legal precedent to support this contention. (Commentor 68)

Response 109

The Department does not agree that Congress or EPA has clearly interpreted Section 316(b) as requiring an analysis of population level impacts. The Department also does not agree that Section 316(b) requires elimination of entrainment and impingement losses. As discussed in Response 85, EPA has recently issued rules for Section 316(b) for new facilities where it explicitly states that it does not include a definition of adverse environmental impact. Please refer to Response 85 for the Department's position on the definition of adverse environmental impact.

Comment 110

One commentor states that NJDEP's draft permit decision-making relies on an incomplete, biased and misleading permit application and is therefore not defensible. Prior to issuing a draft permit for Salem, NJDEP should have and must obtain the information, corrections, analyses and needed improvements recommended by ESSA. This commentor includes excerpts from the ESSA report to support its contention. As a result, the permit is based on faulty, incomplete and misleading

information, studies, data, analyses and conclusions and is therefore arbitrary, capricious and an abuse of NJDEP's decision making authority. In addition to the errors identified by ESSA, US Fish and Wildlife Service (i.e. Commentor 1) and DNREC (i.e. Commentor 61) also identified problems with the permit application based on an independent review by both respective agencies. (Commentor 68)

Response 110

The application submitted by PSEG contains many extensive and comprehensive analyses for the Delaware Estuary Ecosystem. The Department hired ESSA to critique the application and to assist it in its decision-making. However, even after considering ESSA's findings, which did indeed express some criticisms of the application and suggested improvements, the Department found the information in the application sufficient on which to base its decision-making. As stated in Response 104, the Department relied on the technical and scientific analyses in the Administrative Record in making its decision rather than subjective conclusions or opinions provided by PSEG in its application material.

The Department notes that Commentor 1 and Commentor 68 also express support for the renewal permit in their written comments, even though they also included numerous suggestions.

Comment 111

One commentor states that PSEG was already under an obligation to obtain and provide NJDEP with scientifically valid, accurate and defensible studies, data, analyses, information and conclusions and their failure to do so is a violation of their 1994 permit. PSEG should not be rewarded with a new permit for an additional five years to correct their many errors. (Commentor 68)

Response 111

As discussed above in Response 110, the Department found that the analyses included in PSEG's application were sufficient on which to base its decision-making. This analysis of intake losses and the effects of such on the ecosystem is inherently complex. Given the lack of final guidance from EPA for Section 316(b) at this time, there is no one specific way to perform a Section 316(b) analysis. As discussed in Response 31, the Department has determined that PSEG has fully complied with the July 20, 1994 permit.

Comment 112

One commentor suggests that while many of the studies required by the draft permit are intended to correct errors identified by ESSA, the draft permit also makes clear that even if the new studies provide new or different information on the benefits of cooling towers or other technologies at Salem, NJDEP will not require these technology changes. This proposed permit provision is premature and commits NJDEP to a decision uninformed by facts and science. This provision should be deleted and a reopener added that specifically allows NJDEP to act on the new information provided, including a requirement for a new or different technology. (Commentor 68)

Response 112

The Department does not agree that this proposed permit provision commits the Department to a decision uninformed by facts and science. In accordance with N.J.A.C. 7:14A-16.4(b)2, the Department maintains the right to modify a NJPDES permit to incorporate additional conditions or requirements based on "new information". Should new technologies become developed and available that are suitable to the site-specifics of Salem, where these technologies do not have costs that are wholly disproportionate to the environmental benefits, the Department has the right to require PSEG to evaluate such technologies, prepare a cost-benefit analysis and ultimately impose the technology in

accordance with Section 316(b). Please refer to item G.10.a. of Part IV of the final permit for the specific "reopener" language regarding available intake protection technologies.

Regarding the language that this commentor is referring to, the Department had included this specific language in the December 8, 2000 draft permit in an effort to explain that ESSA limited its focus of available technologies at Salem to revised refueling outages and seasonal flow outages. ESSA did not recommend the pursuit of wedgewire screens, dual flow fine mesh screens, modular inclined screens and retrofit with a new closed-cycle cooling system based on the descriptions and proposals included in the Section 316(b) demonstration of the March 4, 1999 application as well as their associated costs and benefits.

Comment 113

One commentor states that the ESSA Report states "The intent of the New Jersey Department of Environmental Protection is to consider an operation permit for an additional five years with conditions that will diminish the adverse effects of the station on the fish population". Section 316(b) requires BTA to "minimize" the impacts of the intake structure, to "diminish" those impacts is not the proper endpoint. Therefore, because NJDEP, ESSA, or both parties misunderstood or misapplied Section 316(b), they failed to provide the appropriate level of review. (Commentor 68)

Response 113

The Scope of Work, which was included in its entirety as Annex 1 of the June 14, 2000 ESSA Report, states "The primary focus of the contractor* review will be for the contractor to review PSE&G's assessment as to whether technological measures can be implemented at Salem to reduce the numbers of organisms that are impinged and entrained at Salem each year where the economic costs are not wholly disproportionate to the benefits pursuant to Section 316(b) of the Clean Water Act, 33 U.S.C. Section 1326." Section 316(b) of the Clean Water Act requires that "...the location, design, construction and capacity of cooling water intake structures shall reflect the best technology available for minimizing adverse environmental impact." The Department maintains that the Scope of Work is consistent with Section 316(b) as well as EPA guidance and interpretation as discussed in Responses 6, 8, 9, 17, and 18. The Department also maintains that ESSA clearly understood that it was retained to provide technical and scientific assistance to the Department in connection with its review of PSEG's application. The Department retains full regulatory responsibility for issuing NJPDES permits, including Section 316(b) Determinations, and the Department clearly understood its goal.

Comment 114

One commentor states that the Fact Sheet contains conflicting information and it is unclear what actions in the 1994 permit and in the present draft permit are intended by NJDEP to fulfill the technology requirements of 316(b). In any case, NJDEP has misapplied the requirements found in Section 316(b) and it must redraft the permit, clearly laying out and applying its interpretation of the law so it accurately reflects congressional intent, court interpretations, and agency decision making. (Commentor 68)

Response 114

The Department does not agree. On page 77 of the December 8, 2000 draft permit Fact Sheet under the heading "Minimization of Impacts through Continued and Proposed Special Conditions" the Department states:

The Department has determined that the Station's existing once-through cooling system in conjunction with an intake flow limitation, an enhanced fish return system and the study and potential implementation of a multi-sensory hybrid system constitutes best technology

available. The Department is also continuing to require further development of the Special Conditions, which include wetlands restoration and enhancement, continued monitoring of the fish ladders; and improved biological monitoring. Lastly, the Department is requiring further study and analysis relating to entrainment and impingement and productivity on the marsh. These Special Conditions are required to minimize environmental impacts related to the Station's cooling water system pursuant to Section 316(b) of the Clean Water Act.

Therefore, the Department maintains that it has clearly defined BTA. In addition, the Department has also made clear that the Special Conditions such as continued wetlands restoration and enhancement, continued monitoring of the fish ladders and improved biological monitoring serve to assess and/or minimize the environmental impacts associated with Salem and are not part of the BTA determination. See also Responses 6, 8, 9, 17, 18, and 113.

Comment 115

One commentor states that the extensive body of data, information and analyses included in PSEG's application supports NJDEP's BTA determination. Another commentor supports the study of a multi-sensory hybrid system. (Commentors 61 and 71)

Response 115

The Department agrees with these comments and hereby incorporates this information into the Administrative Record.

Comment 116

One commentor states that sound is a promising technology for deterring certain species, such as bay anchovy and river herring, at certain times of the year. This commentor supports continuation of sound studies, as mandated in the permit, to see if sound deterrents can be installed on a permanent basis. (Commentor 71)

Response 116

The Department agrees with these comments and hereby incorporates this information into the Administrative Record.

Comment 117

Some commentors state that NJDEP only considers the study of a multi-sensory hybrid system, of which strobe light/air bubble is a component of, as part of the BTA determination rather than implementation of such a system. One commentor states that continued study rather than actual action will allow PSEG to study the plant's life away and never provide protection or benefits to the aquatic life of the Delaware Estuary. Another commentor states that strobe lights will have little or no additional benefit, especially during the day. See Response 9. (Commentors 65, 67, 68)

Response 117

It is important for the Department to require full and complete studies to ensure that there are no negative implications associated with any behavioral deterrent system. Moreover, since these technologies have not been applied in an environment such as at Salem, it is necessary to determine their biological effectiveness before requiring full-scale application at Salem. Therefore, the Department has required further study of the multi-sensory hybrid deterrent system. It would be inappropriate for the Department to require implementation of a technology that has not been adequately studied or, in the case of Salem, has not yet even been defined.

The Department maintains that strobe lights have the potential to minimize impingement and entrainment effects at Salem and therefore warrant further study.

Comment 118

One commentor states that further investigation is needed to determine if sound is a viable method to reduce impingement. Another commentor supports further investigation of behavioral deterrents even though it may only address impingement. (Commentors 1, 61)

Response 118

The Department agrees with these comments and hereby incorporates this information into the Administrative Record.

Comment 119

One commentor states that the sound/ strobe light approach in the current permit would only cost about 12 cents a year for the ratepayers but only saves an additional 1.3% of fish. This is significantly less than the 95% of fish that could be saved by cooling towers. (Commentor 68)

Response 119

Because a cost-benefit analysis for sound was not included in the March 4, 1999 permit application, it is unclear to the Department where the cost estimate of 12 cents a year came from as well as the percentage of 1.3% of fish for a sound/strobe option. This commentor did not provide background information or calculations to justify this estimate.

The Department maintains that the strobe light/air bubble curtain technology has potential at Salem and merits further study. In addition, as stated on page 69 of the Fact Sheet, the Department is not requiring implementation of the strobe light/air bubble curtain technology, as a component of a multi-sensory hybrid system, rather it is only requiring further study to determine its effectiveness. The cost estimate included in PSEG's application for the strobe light/air bubble curtain technology considers construction and installation costs as well as operation and maintenance costs (of a fully implemented system). Therefore, the Department has determined that study of a multi-sensory hybrid system, of which strobe light/air bubble is a component, is an available technology at a cost, which is not wholly disproportionate to the environmental benefits to be realized. As described in Response 112, the Department has included a reopener clause as item G.10.a. of Part IV of this final permit to state that the Department will require implementation of any intake protection technologies that are available at a cost that is not wholly disproportionate to the environmental benefits. Therefore, if the findings of this study are favorable, the Department will require implementation of this technology.

Please refer to Response 9 for the Department's position on cooling towers.

Comment 120

One commentor states that prompt implementation of proven sound deterrent techniques should be required. For example, tests have shown that ultrasound is an effective deterrent for repelling alosids; therefore, the permit should require full scale implementation. (Commentor 69)

Response 120

The Department has determined that sound deterrents, which may include ultrasound, are not a "proven technology" at Salem at this time. Sound deterrents are still a new intake protection technology. To the Department's knowledge, there are only a few plants in the nation that have a fully implemented sound deterrent system. One of these systems is designed specifically for alosid species (i.e. alewives) which have a high rate of impingement at that particular plant. Although the

1994 cage test study performed at Salem showed that sound shows promise for deterring alosid species, the alosid species that are representative important species at Salem (e.g. alewife, blueback herring, American shad) do not experience high rates of impingement at Salem. With regards to sound deterrents and the in-situ tests performed by PSEG, ESSA states on page 39: "Based on these data, sound is NOT very effective in reducing TOTAL FISH IMPINGEMENT at Salem GS. However, there is evidence based on the 1994 cage tests (and in the literature) that some sounds (e.g., FM chirp, with a center frequency of 121.8 kHz) show promise for deterring alosid species."

It is also important to note that sound has the potential to attract certain species. As can be seen from Table 3-2 on page 41 of the ESSA report, sound was shown to be a statistically significant attractant for blue crab in the "in-situ tests". Therefore, given the newness of this technology as well as any potential negative impacts such a system can cause, it is imperative that the Department exercises caution in requiring installation of any such technology. Based on these factors, the Department did not include an installation schedule for sound deterrents in this final permit.

The Department did require further investigation of sound as part of a multi-sensory hybrid intake protection technology in this final permit. Specifically, the Department is requiring study of a multi-sensory hybrid intake protection technology system, which could include sound deterrents, strobe lights, and/or air bubbles. Regarding implementation of any intake protection technologies, the Department has included a reopener clause as item G.10.a. of the final permit to indicate that the Department will implement any available intake protection technology so long as the costs are not wholly disproportionate to the environmental benefits. Implementation of any cost-effective intake protection technology will be done in the most expedient manner possible.

Comment 121

One commentor states that sound deterrents are not a proven technology and an unproved experiment can not fulfill the BTA requirement of the Clean Water Act. Sound deterrents are an experiment with little potential for positive results. If sound worked, the sound generated by 2 million gallons per hour flowing into the intake should keep the fish away, but it doesn't. Sound deterrents will just add noise pollution to the environment that can affect whale communication and navigation. Another commentor states that even though more fish were impinged with the sound on than off, NJDEP continues to require further sound studies. (Commentors 65, 119)

Response 121

While the Department agrees that sound deterrents are indeed a "new technology", the Department maintains that sound deterrents have merit for Salem as discussed in Response 120. The sound deterrents under consideration for Salem result in the transmission of sounds very different than the flow of water as suggested by one commentor. For example, the in-situ studies performed by PSEG included ultrasonic and sonic signals. The Department is aware that sound deterrents can also have detrimental effects and will exercise caution regarding any implementation.

Comment 122

The commentor states that PSEG failed in its obligation to study sound as an option for reducing impingement as ESSA identified a number of shortcomings with the sound deterrent study. Since NJDEP is allowing PSEG to engage in more studies, NJDEP is rewarding PSEG for their shoddy study. It is inappropriate for NJDEP to state that sound deterrents reflect BTA for minimizing adverse environmental impacts. Further, since ESSA found that sound was not very effective in reducing total fish impingement, it would be prudent for PSEG to invest their financial resources for technologies that provide greater benefits. (Commentor 68)

Response 122

The Department does not agree with the commentor's characterization of PSEG's study. As stated by ESSA in its June 14, 2000 report, "For the required study of the effects of sound as a fish deterrent, the investigators did a thorough job in data collection and analysis. It is indeed one of the most comprehensive data collections on sound and fish response to date." Because ESSA determined that sound deterrents warranted further study, it recommended sound as a component of a multi-sensory hybrid intake protection technology.

Comment 123

A few commentors state that NJDEP should require further investigation of seasonal flow outages. One commentor states that the only way to reduce entrainment is to reduce intake flow. Other commentors note that NJDEP did not require consideration of ecologically protective scheduled outages despite ESSA's conclusion that this option has potential for application at Salem. One commentor states that because this option has undisputed benefits, a short-term study (3 - 6 months) should be required to evaluate the feasibility of this option and to identify the periods of time when scheduled outages would result in maximization of benefits. Further, the permit should require either prompt implementation of the Department's chosen outage plant or a reopener clause for implementation. (Commentors 61, 68, 69)

Response 123

The Department agrees that revised refueling outages (also referred to as seasonal outages) have potential for Salem. However, as with all options potentially applicable at Salem, the Department must weigh the costs and benefits in determining if a technology are BTA. Similarly, ESSA stated the following in its June 14, 2000 report: "These technologies, in particular revised outages, have potential for application at Salem. However, more quantitative data on fish entrainment/impingement issues with respect to timing is required to better define the period when an option such as seasonal flow could be used to maximize reduction in entrainment/impingement." In addition, difficulties arise in the fact that periods of high biological productivity (e.g. June and/or July) often coincide with periods of high energy demand. The Department agreed that this option required further study and directed the permittee to conduct additional analyses. PSEG submitted reports in July 2000 and September 2000 that considered six additional seasonal outage shifting scenarios utilizing the same methodology used in the March 4, 1999 application with updated information on power costs, reflecting the recent deregulation of the electric wholesale market. The Department reviewed this information and concluded that the Department is unable to determine at this time that the costs of implementing this technology are not wholly disproportionate to the expected environmental benefits.

To better understand any future potential for this technology, improved impingement and entrainment data sets as well as improved biological monitoring are needed to better define the period of outage and the associated environmental benefits. It is important to note that the Department as the permitting agency has the "burden of proof" in defining the feasibility and relative cost/benefit of any alternate intake protection technologies. The Department has required an improved biological monitoring program as well as improved impingement and entrainment data sampling as part of its final permit. Therefore, this improved data could help to define a revised refueling outage period in the future.

Comment 124

One commentor states that a feasibility study for a reduction in approach velocity should be considered. A lower approach velocity could improve the ability of fish to avoid impingement and

could alleviate the force with which sensitive fish species are impinged upon the intake screens. (Commentor 69)

Response 124

There are two ways to reduce approach velocity at Salem. One way would be to reduce the intake flow and the other would be to increase the size of the intake structure. PSEG has considered both of these options in submittals to the Department, which are part of the Administrative Record for this permit.

As part of its March 4, 1999 application, PSEG evaluated "seasonal flow reductions" as an intake protection technology. Specifically, PSEG considered a 10%, 25% and 45% flow reduction coincident with periods of high biological productivity. This alternative would allow for a flow reduction and would therefore reduce the approach velocity.

However, seasonal flow reductions would result in an increase in the differential temperature, in excess of the differential temperature currently experienced at Salem. This is due to the fact that a reduction in flow would result in a greater differential temperature to the once-through cooling water and hence to the effluent discharge. A greater differential temperature may have a detrimental effect on any organisms that may have survived entrainment effects under the current operating configuration. In addition, a new Section 316(a) determination would need to be submitted for the Department's review to assess the effects of any increased differential temperature to the balanced indigenous population. Also, because periods of high biological productivity (e.g. June, July) often coincide with periods of great energy demands, the costs of replacement power are significant. Because of these many factors, the cost/benefit ratios for seasonal flow reductions show costs that are wholly disproportionate to the environmental benefits to be realized. Specifically, as indicated in PSEG's March 4, 1999 application, the cost/benefit ratio for seasonal flow reductions (with a constant differential temperature and hence a reduced power output) are 28.7 for a 10% reduction, 32.9 for a 25% reduction and 34.0 for a 45% reduction. These cost/benefit ratios are significantly higher than any the Department is aware of having been accepted as "not wholly disproportionate".

A second way to reduce approach velocity at Salem would be to expand the cooling water intake structure and hence the area of the intakes. This option was considered by PSEG as part of its 1984 Section 316(b) determination. The current cooling water intake structures consist of twelve intake bays and the approach velocity varies between 1.0 and 1.5 feet per second (fps).

Assuming that such a modification could be accommodated given the site layout, this alternative represents a major structural change, requiring substantial time for planning and design; actual construction of the extended structure; substantial modifications of the existing structure, including installation of additional circulating water intake lines; dredging and filling in the Delaware River; and equipment installation and testing. It is estimated that the construction of the extension would take approximately 30 months. Although a portion of the project could be completed during a normal refueling outage, a substantial outage extension would require scheduling and planning for replacement generation capacity from other sources. As referenced in the 1984 Section 316(b) demonstration, the costs of this option were at that time estimated to be 95.0 million dollars.

In general, entrainment survivals would not appreciably be affected by this alternative. Impingement survival and abundance estimates might be slightly affected by implementation of this alternative. In summary, the Department has determined that the costs of this alternative are very high and the benefits are not significant. As a result the costs are wholly disproportionate to the environmental benefits. The Department does not believe that further study of this technology is warranted.

Comment 125

Two couple of commentors state that NJDEP should require further investigation of a jetty. One commentor states that no provision for study or implementation of an elongated jetty was included in the permit despite its recommendation by ESSA. The permit should require study and potential implementation if a jetty is projected as being effective in deflecting fish from the intake. (Commentors 61, 69)

Response 125

ESSA suggested in its report that a jetty be considered as a potential intake protection technology. On page 49 of the ESSA report it states "A first step in the exploration of an extended jetty as a fish defense system for Salem should be to undertake hydraulic modeling studies of flow patterns and velocities around a hypothetical jetty." Page 48 states that a simple extended jetty could "Reduce fish movement into the station by deflecting them back along the river rather than [towards] shore migration, possibly reducing impingement (perhaps this could be modeled using flow patterns)."

ESSA noted that impingement data at Ontario Power Generation's (OPG's) Thunder Bay Generating station located on the Mission River (Lake Superior) indicated a decline in impingement that may be attributed in part to an extended intake groin or jetty. ESSA also identified OPG's Pickering Nuclear Generating Station and Lakeview Generating Station on Lake Ontario as having extended groins.

The Department has carefully reviewed the available information and has the following concerns, which must be resolved before requiring implementation of a jetty:

- There are issues associated with the use of a jetty in an estuarine environment such as that in which Salem is located. The stations identified by ESSA above are located in lake environments which are very different from an estuarine environment. The Delaware Estuary in the vicinity of the Salem Station is characterized by significant tidal action, highly turbid waters and significant detrital loading, particularly in the spring.
- Although the use of a jetty may be reducing impingement and/or entrainment effects at the plants noted by ESSA, there are no studies available at this time specifically documenting the minimization of impingement and entrainment due to the groin or jetty.
- A jetty could result in the undesired effect of being an attractant to aquatic life where aquatic life could congregate or migrate along the jetty and then be drawn into the plant.
- A jetty could also have implications to the operating conditions of Salem where the heated effluent (Salem's discharge is offshore) would be re-circulated into the intake since the jetty may potentially act as a deterrent for mixing.
- There are navigational issues associated with the construction of a jetty as well as with the permanent presence of a jetty.

Based on the concerns noted above, it would be premature to require the implementation of a jetty. However, the Department is further evaluating the potential effectiveness of a jetty through inclusion of ESSA's recommendations for understanding the flow dynamics at the intake of Salem. These requirements are included as item G.9.a.of Part IV of the final permit.

In conclusion, the Department has not dismissed the concept of a jetty. However, the Department has determined that hydrodynamic studies are necessary to see if a jetty would produce the desired effects. It is the Department's intent to require a jetty if technical studies support its effectiveness.

Comment 126

Some commentors suggest that PSEG should continue to investigate and implement measures to reduce impingement, but perhaps more importantly investigate and implement measures to reduce entrainment. One commentor states that the permit BTA conditions do nothing to reduce entrainment losses, which account for 99 percent of Salem's adverse impact, and reduce impingement losses under the best circumstances by only 0.2 percent. Another commentor states that the permit BTA conditions do nothing to reduce the entrainment impacts where entrainment is the primary mode of fish kills inflicted by the plant. (Commentors 1, 61, 67, 68)

Response 126

The Department agrees that the entrainment losses at the cooling water intake structure are numerically larger than the impingement losses. The Department also acknowledges that the BTA measures in the permit will address impingement losses to a greater degree than entrainment losses, but the BTA measures in the permit are the only technologies that were found to be available and documented at a cost that is not wholly disproportionate to expected environmental benefits. Moreover, the special conditions in the permit, namely the wetlands restoration program and fish ladder requirements, have and will continue to address impingement as well as entrainment losses by increasing the production of fish in the Delaware Estuary.

Section 316(b) does not require minimization of entrainment or impingement losses without regard to other considerations, including cost. As previously explained in Response 9, the determination of BTA includes a consideration of the costs of alternative technological options in relation to the environmental benefits received. The USEPA Administrator stated In the Matter of Public Service Co. of New Hampshire (the Seabrook Decision) at page 13 "...I do not believe that it is reasonable to interpret Section 316(b) as requiring the use of technology whose cost is wholly disproportionate to the environmental benefit to be gained." This interpretation was upheld by the court in Seacoast Anti-Pollution League v. Costle 597 F.2d 306 (1st Cir. 1979).

Under this standard, the USEPA determined in 1981 with respect to Tampa Electric Company's Big Bend Unit 4 in Florida that the installation of fine-mesh screens, which were expected to reduce entrainment impacts by approximately 56%, constituted best technology available under Section 316(b). The USEPA did not require the elimination of entrainment impacts, it only required the minimization of entrainment impacts to a level where the costs of the reduction did not exceed the environmental benefits to be realized. Indeed, in other cases, USEPA has approved once-through cooling systems as BTA without requiring any reductions in entrainment. See, e.g., Commonwealth Edison (Quad Cities Nuclear Power Station), NPDES Permit No. IL0005037 (Oct. 4, 1988); In the Matter of Orlando Utilities Commission (Indian River Plant), NPDES Permit No. FL0000680 (Finding and Determination under 33 U.S.C 1236, July 11, 1983).

Comment 127

A few commentors state that the intake screen improvements reduce impingement losses by 50%. One commentor states that the modified intake screens represent the best management practices available. These screen improvements can be used at other facilities in the US and throughout the world. (Commentors 71, 80, 82)

Response 127

The benefits to impingement mortality vary across species and, although the Department agrees that the intake screens result in a lesser amount of impingement mortality, the Department does not agree that it is appropriate to average these efficacy rates across all species as a percentage such as “50%”.

The Department agrees that the screen improvements at Salem can be modeled at other facilities where such improvements will work towards advancing the implementation of better intake protection technologies.

Comment 128

One commentor states that in reviewing impingement/entrainment estimates, the modifications to the intake screens made in 1995 do not appear to have resulted in significant reductions in losses to all sensitive species. (Commentor 69)

Response 128

Based on the Department’s review of this study as well as its conducting a site inspection, the Department determined that because the improved intake screens were not designed to minimize entrainment losses (the openings are too large to minimize entrainment), it is not appropriate to expect entrainment losses to be reduced as a result of the improved screens.

It is also not appropriate to draw the conclusion that the screens are not effective in reducing losses based solely on yearly impingement data. Higher impingement and/or entrainment losses during a particular year could simply be a result of greater populations during that particular year. In fact, as summarized in Response 88, the trends analysis of biological sampling programs shows that populations have increased for most species. For example, Atlantic croaker is shown as a 3610.3 percent increase for the PSEG Nearfield Bottom Trawl study in comparing the years 1991 to 1998. Atlantic Croaker was the number one species impinged for 1998.

To assess the efficacy of the improved intake screens, a focused study (that is not confounded by changes in abundance of fish in the estuary) such as the one discussed in Appendix G-1-2 of the March 4, 1999 application entitled “Biological Efficiency of Improved Intake Screens” is needed. Based on its review of this study as well as conducting a site inspection, ESSA stated “The Ristroph screen modifications are innovative, and represent BTA at the screens for reducing fish mortalities.” Therefore, based on the Department’s review and ESSA’s review, the Department has determined that the modified Ristroph screens are helping to improve impingement survival for many species. However, as recommended by ESSA, the Department has included specific permit conditions to study and potentially further improve the intake screen technology by enhancing the design and operation of the fish return system.

Comment 129

A few commentors state that the technologies used by PSEG largely involve antiquated fish screening and fish return devices designed only to prevent debris from entering the cooling water system. Some commentors state that the enhanced Ristroph screens at Salem do little to protect the mortality rate of weaker species such as bay anchovy and alewife, as cited by ESSA. Other techniques are left for future study, but not implementation. Some commentors note that the intake screen modifications fail to address entrainment impacts. (Commentors 65, 67, 68)

Response 129

While the efficacy of the modified Ristroph traveling screens varies across each species, the Department maintains that the intake screens are effective in reducing the impingement mortality rates of many species. See Response 128 referencing ESSA's conclusions on the intake screens. The Department has determined that there is a need to address other species that may not be helped by the screens by requiring study of the multi-sensory hybrid intake protection technology as discussed in Response 117. The Department notes that the screens have resulted in some level of improved survival for certain species. The Department acknowledges that the intake screens do little to prevent entrainment mortality.

Comment 130

One commentor suggests that additional measures to minimize losses should be required which may include reducing flow, additional sound deterrent studies and implementation, air curtain/strobe light technologies and improving intake screens to reduce entrainment. This recommendation is consistent with Section 316(b) of the CWA and Commentor 1's Mitigation Policy. (Commentor 1)

Response 130

The Department agrees that it should continue to investigate measures to minimize impingement and entrainment losses as this commentor suggests.

However, with respect to further improving intake screens to reduce entrainment, this option has been extensively evaluated and it was determined that currently the costs are wholly disproportionate to the benefits. This is due in part to the significant detrital (i.e. plant matter) loadings present at Salem as well as the large volume of intake flow.

Comment 131

One commentor supports study and potential improvements to the fish return system. Another commentor suggests that implementation of an improved fish return system should be required in the permit. One commentor states that improvements to the fish return system described in the permit contain no commitment for action so these changes may never materialize. It is suggested that NJDEP issue a major modification for any changes to the fish return sluice to allow the public to provide comment on any changes. (Commentors 61, 68, 69)

Response 131

The Department agrees that improvements to the fish return system are worth pursuing and has incorporated such requirements as item G.2.b. of Part IV of the final permit. The goal of these requirements is to enhance the effectiveness of the Ristroph screens by requiring study and potential improvements of the fish return flume that may include alternate flows, velocities and depth profiles. It would be premature to require a commitment for action at this time. This is due to the fact that the Department can not mandate a newly designed fish return sluice and/or operating conditions since it is unknown what these changes will be at this time. Please refer to Response to PSEG Comment 10 for more detail regarding the steps that are required in assessing any changes.

Because the Department wanted to ensure that any necessary changes be implemented in an expeditious manner, the Department incorporated a condition to allow implementation of these changes as a minor permit modification. The Department maintains that this condition is appropriate since any submittals concerning the fish return system are part of the public record and are therefore available to the public for review.

Comment 132

One commentor states that improvements to the intake system have benefited the ecology of the area. Other commentors state that the studies funded by PSEG are helping to advance the science of cooling water intake technologies. (Commentors 34, 49, 57, 80)

Response 132

The Department agrees with these comments and hereby incorporates this information into the Administrative Record.

Comment 133

Several commentors state that biological monitoring is important. It is critically important that the health of the fish population be monitored throughout not only the life of the permit but also that of any renewal permit that may be issued thereafter. (Commentors 7, 28, 34, 49, 65, 80)

Response 133

The Department agrees that biological monitoring is important as illustrated by the fact that the Department has required improved biological monitoring in its final permit as item G.6.a. of Part IV. The appropriateness of continued biological monitoring requirements will be objectively evaluated with each NJPDES permit.

Comment 134

Citing sampling inconsistencies and inappropriate interpretation of sampling with examples, the commentor questions PSEG's ability to adequately sample finfish and determine effects from the Salem Generating Station on finfish in the Delaware Estuary. (Commentor 1)

Response 134

Although the Department agrees that the biological monitoring programs can be improved upon, the Department maintains that biological monitoring performed by PSEG is valuable. The objective of certain sampling programs performed by PSEG is to compliment the existing long-term biological monitoring performed by New Jersey and Delaware. The Department has required specific improvements to the biological monitoring program as item G.6.a. to further improve upon biological monitoring.

As required in the July 20, 1994 permit, PSEG submitted the biological monitoring program to the Monitoring Advisory Committee (MAC) who's role was to provide technical advice for biological monitoring. Under the terms of this renewal permit, PSEG is required to submit the biological monitoring to the Estuary Enhancement Program Advisory Committee (EEPAC) as described in item G.6. The role of the EEPAC is to provide technical advice concerning the Management Plans for the wetland restoration sites as well as biological monitoring.

Comment 135

A few commentors suggest that PSEG be required to fund finfish biological monitoring. One commentor states that monitoring should be conducted by New Jersey and Delaware to ensure consistency of the sampling program. Another commentor suggests that a trust fund be established to support or augment New Jersey and Delaware fishery surveys for key estuarine species. One commentor recommends that PSEG be required to fund the state or Delaware Basin Fish and Wildlife Cooperative Programs since PSEG had relied on the fisheries data from those programs. (Commentors 1, 51, 61)

Response 135

The funding of state finfish biological monitoring is outside the scope of the NJPDES permit and has therefore not been addressed as part of this final permit. However, the Department notes that PSEG has agreed to fund additional biological monitoring under its June 2001 Settlement Agreement with DNREC.

Comment 136

Many commentors suggest that continued studies on the marshes are necessary with respect to wetland enhancements. Several commentors note the importance of monitoring fish production from the restored marshes as is required in the draft permit. Another commentor states that three years of monitoring on the marsh is not adequate to fully evaluate what the program will accomplish. It is particularly important that monitoring be continued with respect to finfish utilization for the *Phragmites*-dominated marshes. (Commentors 1, 22, 28, 62, 119)

Response 136

The Department agrees that an important component of the Biological Monitoring Program is continued studies of the marsh. As such, the Department has specifically included certain components of marsh studies in describing the improved biological monitoring program as item G.6.a. of the final permit. It is important to note that it is the biological monitoring program work plan that contains extensive detail regarding biological monitoring rather than the NJPDES permit. PSEG is required to submit this work plan, as well as any changes or updates to the work plan, to the Department for its approval.

Comment 137

One commentor supports juvenile herring production monitoring in connection with the fish ladder sites. This commentor also supports required operation and maintenance of fish ladders.

Response 137

Please refer to Response to PSEG Comment 20 and Response to PSEG Comment 21.

Comment 138

One commentor suggests that a trust fund be established for long-term research and implementation of *Phragmites*-control practices as partial compensation for fisheries losses. (Commentor 61)

Response 138

The Department has not required PSEG to establish a trust fund for long-term implementation for *Phragmites*-control. This knowledge is already being gathered through PSEG's test area program which is being implemented through the Department approved Management Plans for the *Phragmites*-control sites.

Comment 139

One commentor supports juvenile herring production monitoring in connection with the fish ladder sites as well as required operation and maintenance of the fish ladders. This commentor further suggests that a more quantitative approach to monitoring passage through eight fish ladders be required. Specifically, quantitative estimates (with confidence intervals) on the number of adult river herring passing upstream should be monitored. Secondly, since the true metric of success of the fish ladders is juvenile production, the population of out migrating juveniles needs to be measured. (Commentor 61)

Response 139

Please refer to Response to PSEG Comment 21 regarding juvenile herring production monitoring. The issue of a more quantitative approach to monitoring adult river herring passage is an issue that should be addressed by the Estuary Enhancement Program Advisory Committee (EEPAC) for potential inclusion as part of the Biological Monitoring Program Work Plan. Please note that the EEPOC specified in the December 8, 2000 draft permit has been renamed as the EEPAC in this final permit renewal.

Comment 140

One commentor states that biological monitoring and sampling protocol should continue to be reviewed by the Monitoring Advisory Committee. Another commentor states that the MPAC and MAC should continue to be consulted for advice on restoration matters. (Commentors 1, 28)

Response 140

The Department agrees. This suggestion is consistent with the defined role of the EEPAC as specified in item G.3.d. of Part IV of the final permit.

Comment 141

One commentor states that PSEG should be required to submit the Plan of Study and the completed study on intake protection technologies to the EEPAC, in addition to the Department. (Commentor 61)

Response 141

Review of study plans for technological measures is beyond the expertise of the members of the EEPAC who have expertise in fisheries biology and marsh restoration. The Department will conduct reviews of the study plan and will engage the services of a contractor to aid in its review, if necessary. Any studies submitted to comply with NJPDES permit conditions are part of the Administrative Record and are therefore available for review by the public. Any members of the EEPAC may review these study plans if they wish to do so.

Comment 142

One commentor requests a seat on the EEPOC. Another commentor requests two seats on the EEPOC where one representative can address fisheries biological monitoring issues and one representative can address wetland restoration issues. Another commentor states that the EEPOC should be expanded to include federal resource agencies. (Commentors 51, 61, 62)

Response 142

As discussed in the Fact Sheet of the December 8, 2000 draft permit (page 42), the Department determined that it would be appropriate and beneficial to merge the Management Plan Advisory Committee ("MPAC") (whose role was to provide technical advice concerning the Management Plans for the wetland restoration sites) and the Monitoring Advisory Committee ("MAC") (whose role was to provide technical advice concerning the biological monitoring program) into one committee namely the Estuary Enhancement Program Advisory Committee ("EEPAC"). As required in item G.3.d.i. of Part IV of the final permit, the permittee shall submit a list of proposed EEPAC (i.e. EEPOC is renamed as EEPAC as discussed in Response to PSEG Comment 17) members to the Department within the effective date of the permit (EDP) + 90 days. The Department will approve and/or make recommendations to ensure approval of this at that time.

Because the EEPAC requires a minimum of three representatives from agencies that have jurisdiction over wetlands restoration activities and/or aquatic resources, it would be appropriate to approve the

participation of these commentors, particularly with respect to those agencies who have been represented on the MPAC and/or MAC in the past.

Comment 143

A few commentors state that the MPAC and MAC are important to the program. One commentor states that the Adaptive Management process is also important to the success of the program. NJDEP needs to closely monitor that the composition of these groups is unbiased and contains enough technical expertise to advise properly. Another commentor expresses support for the permit condition that requires establishment of the EEPOC. (Commentor 7, 28, 102)

Response 143

The Department agrees with these comments. However, it is important to note that the MPAC and MAC have been merged into one committee, namely the EEPAC (please refer to PSEG Comment 17 regarding the name change for EEPOC), in the final permit. The permit condition requiring formation of the EEPAC is included as item G.3.d. of Part IV. The Adaptive Management process is described in the existing Management Plans for each EEP site. The Management Plans are automatically incorporated as NJPDES permit conditions as specified in item G.3.b of Part IV.

Comment 144

One commentor states that NJDEP did not include a requirement in the permit regarding ESSA's recommendation for impingement mortality to be measured in situ after fish exit the return sluice. The impingement mortality could be quantified by using a large cage positioned to catch the fish as they leave the return sluice. This study is important and PSEG should have one year, rather than 180 days to complete this special report. (Commentor 61)

Response 144

The Department did include a requirement for this study as item G.2.b.i. of Part IV in the December 8, 2000 draft permit. This requirement has been maintained in the final permit with changes to the time frame as suggested by this commentor. Please refer to Response to PSEG Comment 10 for additional information regarding this issue.

Comment 145

One commentor states that PSEG should continue to be responsible for the operation and maintenance of fish ladders and is responsible for verifying that juvenile production meets target levels at all fish ladder sites. (Commentor 61)

Response 145

The Department agrees and has included such conditions in this final permit. Please refer to Response to PSEG Comment 21 and Response to PSEG Comment 22 for additional detail.

Comment 146

This commentor opposes the use of a heat dissipation zone and supports the use of technologies that do not require this variance. Alteration of temperature within areas of the estuary, throughout the year, modifies the physical (i.e. temperature) and chemical (availability of some nutrients varies with temperature) habitats and thus can significantly alter biological communities. Thermal impacts must be evaluated by the National Marine Fisheries Service (NMFS) as part of an Essential Fish Habitat (EFH) assessment. (Commentor 65)

Response 146

Heat dissipation areas are authorized by the Department pursuant to the Water Quality Regulations of the Delaware River Basin Commission ("DRBC"). The DRBC establishes heat dissipation areas in "dockets" issued to the permittee. Any opposition to the use of a heat dissipation area for Salem should be directed to the DRBC.

In its permit decision, the Department granted a Section 316(a) variance to Salem and stated that compliance with the temperature permit limits is expected to assure the protection and propagation of the balanced indigenous population. In making this determination, the Department considered a significant amount of data, analyses and modeling pertaining to the thermal plume and its interaction with other pollutants as well as a biothermal assessment. Therefore, the Department has determined that it appropriately considered the impacts to the receiving water as this commentor has suggested.

As discussed in Response 97, the Department will pursue the need for an Essential Fish Habitat Analysis with NOAA.

Comment 147

One commentor suggests establishment of a small town center with on-site tours to allow a visual educational program to educate the every day person on the success of the marsh and to allow them to see the baby fish first hand. This commentor further states that he is confident that any visitor to such a public use site would be afforded an opportunity to see the abundance of life on the newly formed marsh and as a result would support this public policy for habitat restoration. Another commentor expresses gratitude for PSEG's interest in the potential development of the Abel and Mary Nicholson house into a nature/cultural center for Cumberland County. (Commentors 28, 32)

Response 147

The Department agrees that an education center would be extremely valuable to aid in the public's understanding of the value of marshes and the ecological processes, which occur in the marsh and estuarine system. An education center, however, is not an intake technology pursuant to Section 316(b) and has not been voluntarily proposed by the Permittee as part of its NJPDES Permit. Therefore, the Department cannot mandate such.

Comment 148

A couple of commentors state that there is a silting problem with the Butcher Ditch Ramp and an on-site meeting is suggested to discuss solutions to rectify that problem. The dike constructed on the Cottrell property was a mistake because of the need for long term maintenance and mosquito issues. (Commentors 32, 33)

Response 148

The permit requires PSEG to "continue to implement the Management Plans with respect to maintenance during any period of time the NJPDES permit its extended, including any lands that have met the success criteria." The issues raised in this comment should be addressed as part of the implementation of the Management Plan process and are outside the scope of the NJPDES review. However, the Department will ensure that PSEG is notified of these issues.

By way of background, the Management Plans include site-specific public use plans that require maintenance of the public use facilities among other things. Presently the public access facilities are maintained for PSEG by The Nature Conservancy. At the sites, The Nature Conservancy provides ongoing site monitoring, maintenance and public use management patrols of the sites; implements

overall public access plans, and manages elements of the environmental outreach program for schools, communities and the general public.

Comment 149

One commentor states that the twenty-four osprey nesting platforms need to be properly maintained and their use documented. (Commentor 28)

Response 149

PSEG's restoration process has incorporated many features that have benefited threatened species. These include the construction of 20 osprey platforms. Currently, the maintenance of these platforms and documentation of their use is conducted by The Nature Conservancy as part of its contracted maintenance responsibilities. As an experienced advocate of environmental protection, The Nature Conservancy is well-qualified to conduct this maintenance in accordance with accepted practices.

Comment 150

This commentor expresses concern regarding the vegetational succession within special patches of high marsh created for the Northern Harriers and suggest that these areas be evaluated. (Commentor 120)

Response 150

PSEG's restoration design for the Commercial Township Salt Hay Farm Wetland Restoration Site included the construction of high marsh islands using material dredged from constructed channels. Construction permits issued by the Department's Land Use Regulation Program required planting on certain of these high marsh islands and, following establishment of suitable vegetated habitat, monitoring to determine use by Northern Harriers. PSEG continues to monitor the establishment of vegetation on these high marsh islands and is in full compliance with the applicable permit conditions.

Comment 151

Page 40 of the Fact Sheet has a column with the heading "Completion of Restoration Implementation Action." What does that mean? Does it mean there will be no further action after the date given? (Commentor 68)

Response 151

For each of the wetland restoration sites there is an Adaptive Management Plan to ensure that the success criteria are met. The dates listed in the column headed "Completion of Restoration Implementation Action" refers to the date that the initial wetland restoration activities are completed for each site. This date does not mean that no further action will be taken after the date given. This is an iterative process and if the EEPAC, the Department and other appropriate parties deem further action appropriate after review, this action will be required.

Comment 152

Why is there less monitoring at DSN 487B (once/batch) and DSN 489 (monthly) than is required at DSN 48C (twice/month). (Commentor 68)

Response 152

Outfall 487B is from the #3 skim tank and discharges only occur in an emergency and on a batch type basis. Therefore, a "once/batch" monitoring frequency is most appropriate. This "once/batch" monitoring frequency was retained from the July 20, 1994 NJPDES permit. DSN 48C is an internal monitoring point after all treatment has been performed but prior to mixing with the circulating water system effluent. Based on a review of discharge monitoring report (DMR) data, wastewater at this

point has the potential to contain pollutants and have a greater variability of pollutants thus monthly monitoring is appropriate. DSN 489 collects roof drains, sumps and floor drains and discharges to the oil/water separator. Considering the nature of these wastewater components, the monthly monitoring frequency for DSN 489 is appropriate.

Comment 153

Salem has never come close to the maximum permitted temperatures of 115°C (46.1°F, June 1-September 30) and 110°C (43.3°F, October 1 - May 31) based on information provided on page 23 of the fact sheet. Therefore, we recommend that the permitted temperature limit be reduced. (Commentor 68)

Response 153

The commentor has reversed the temperature designations listed in the December 8, 2000 draft NJPDES permit. The correct values are 115°F (46.1 °C) and 110°F (43.3 °C). The information provided on page 23 of the Fact Sheet just covers the period from January 1999 through June 2000 and thus does not cover the inter-annual variability in temperatures. A review of historical data indicates that infrequently in the summer (e.g. July-August) there can be high ambient temperatures (e.g. exceeding 85 °F) and elevated excess temperatures in the outfall (e.g. 23 °F), which might cause the resultant effluent temperatures to be high and near these effluent limitations. More importantly, the Department has determined that compliance with these effluent limitations assure protection of the balanced indigenous population/community of fish, shellfish, and wildlife in and on the river. As such, the Department granted a Section 316(a) variance to PSEG.

Comment 154

Has the proposed Delaware Deepening project been considered in assessing the environmental impacts of the facility? (Commentor 68)

Response 154

To the Department's knowledge, the referenced navigation channel-deepening project has been canceled. Potential future projects of this nature will be considered by the Department accordingly.

Comment 155

We are unclear about the toxicity requirement in the permit. Part II seems to say that acute toxicity testing will be performed twice per year, however Part IV, E.4.f. suggests whole effluent testing will be conducted monthly. (Commentor 68)

Response 155

As stated in Part II of the final permit, acute whole effluent toxicity is specified at a twice/year frequency which is consistent with page 16 of the Fact Sheet and pages 2-7 of Part III of the December 8, 2000 draft permit. Part IV E.4.f. of the December 8, 2000 draft NJPDES permit erroneously stated that submission of acute whole effluent toxicity reports shall be conducted on a monthly basis. Part IV.E.4.f of the final permit has been corrected to state that submission of an acute whole effluent toxicity test report shall be submitted within 25 days after completion of a test.

Comment 156

It appears that the service water used to backwash the travelling screens contains chlorine and sodium hypochlorite. What impact does direct contact with these chemicals have on the fish? Why isn't the service water intake also subject to the Section 316(b) requirements requiring Best Technology Available to minimize adverse environmental impact? Why do the travelling screens on the service water intake not have advance Ristroph-type buckets? (Commentor 68)

Response 156

The service water system is a safety-related cooling water system that supplies a dependable, continuous flow of cooling water (under normal and emergency conditions) to the nuclear and turbine area heat exchangers. Service water is withdrawn from the estuary through an intake located approximately 400 feet north of the circulating water intake. The service water intake flow is approximately 4% of Salem's circulating water system intake flow. The potential adverse environmental effects of the Salem Generating Station service water intake were evaluated by the Department prior to issuance of the July 20, 1994 permit, and again in conjunction with issuance of this final permit. PSEG assumed in its analysis that all fish were killed in the service water intake structure and therefore no additional mortality needs to be included to address the use of chlorinated water in the screenwash. Fish losses attributable to the service water intake structure were considered by the Department in making its BTA determinations. In light of the service water intake flow and the extremely low intake velocities, the Department has determined that the existing service water intake is BTA for purposes of Section 316(b).

The potential adverse environmental effects of the Salem Generating Station service water intake were evaluated by the Department prior to issuance of the July 20, 1994 permit and again in conjunction with issuance of the final permit. The Department in making its BTA determinations considered fish losses attributable to the service water intake structure.

The Department anticipates that the analysis of BTA requirements at Salem's service water intake structure may change in the next permit cycle depending on the nature of the requirements which may be included in EPA's scheduled rule regarding BTA requirements at smaller existing facilities. The Department is hopeful that EPA rulemaking regarding BTA requirements at small existing facilities will be final prior to consideration of this issue in the next NJPDES permit renewal cycle.

Comments by PSEG on Specific Permit Conditions

The Department has summarized and prepared responses to PSEG's comments on specific permit language proposed in the December 8, 2000 draft permit in this section below. The corresponding section of the permit that each comment pertains to is also indicated. To differentiate these comments from the comments posed by other interested parties, as in the previous section, the Department identifies the comments in this section with the preface "PSEG" establishing a separate numbering scheme. For example, the first comment of this section is entitled "PSEG Comment 1".

Please note that in many comments, PSEG has proposed alternate language from that in the December 8, 2000 draft permit. To aid in understanding PSEG's requested changes, the Department shows the original December 8, 2000 language with PSEG's suggested deletions of that language indicated with strikethrough (e.g. ~~strikethrough~~) and PSEG's suggested additions to that language indicated with underline (e.g. underline).

PSEG Comment 1, Part III and Permit Cover Page

The Header text on each page of Part III should indicate the correct permittee name which is "PSEG Nuclear LLC." In addition, the property owner is incorrectly identified as "PSEG Power LLC" on the Permit Cover Page. As a result of the New Jersey Electric Discount and Energy Competition Act of 1999 and an order issued by the New Jersey Board of Public Utilities, Public Service Electric and Gas Company transferred all of its nuclear electric generation assets to PSEG Nuclear LLC.

Response to PSEG Comment 1

The name of the facility has been corrected in Part III and the Permit Cover Page as requested.

PSEG Comment 2, Part III; Fact Sheet

Acute Toxicity testing requirements are included on each of DSNs 481, 482, 484, and 485. The Fact Sheet states that "... the permittee is required to perform acute toxicity testing on a minimum of one representative circulating water system outfall ..." (Fact Sheet, Page 16), which is consistent with the existing Permit requirement that testing need only be conducted on the outfall(s) through which DSN 48C is discharging during the sampling event. A footnote should be added to Part III for DSN's 481, 482, 484, and 485 to confirm this understanding.

Response to PSEG Comment 2

A footnote has been added to Part III B., C., E and F, as requested, to clarify the Department's intent.

PSEG Comment 3, Part III.B through G, DSNs 481 through 486, (pH)

The Sampling Frequency for pH, Effluent Gross Value and Intake From Stream is stated as "1/Week" in Part III, consistent with the requirements in the current NJPDES Permit. However, the Fact Sheet erroneously states that monitoring for pH shall be performed three times per week. The Fact Sheet should be modified to confirm that monitoring for pH is required to be performed only once per week.

Response to PSEG Comment 3

PSEG is correct in that the Fact Sheet erroneously specifies a three times per week sampling frequency for pH whereas it should state "1/Week". The monitoring frequency specified in the Fact Sheet of the December 8, 2000 draft permit for this parameter is inconsistent with Part III of this draft permit. The correct monitoring frequency has been specified in this final permit. This information is hereby incorporated into the Administrative Record.

PSEG Comment 4, Part III.J - L, DSNs FAC A, B and C

For DSN's FAC A and B, PSEG believes that the Effluent Net Temperature (Differential Temperature) Sampling Frequency should be "Daily" instead of "Continuous", which is consistent with the existing permit and Part IV, Section G.13.b.iii. In addition, for DSN FAC C, PSEG believes that the Thermal Discharge Sampling Frequency for Heat expressed as MBTU/hr should be "Daily" instead of "Continuous" which is consistent with the existing permit and Part IV, Section G.13.c.ii.

Response to PSEG Comment 4

The Department agrees that it is appropriate for these parameters to be calculated and reported on a "daily basis"; therefore the monitoring frequencies in Part III J - L have been changed as requested. The calculation procedures referenced in Section G.13.b.iii. and Section G.13.c.ii. are to be used for Differential Temperature and Thermal Discharge, respectively, as PSEG has noted. It is important to note that the inputs to the equations for Differential Temperature and Heat, as specified in G.13.b.iii. and G.13.c.ii., are monitored on a continuous basis.

PSEG Comment 5, Part IV G.13.c.ii., DSN FAC C, (T_{int})

The calculation parameter identified as " T_{int} " at Part IV, Section G.13.c.ii, page 14 and the Fact Sheet, page 25 is identified as "effluent temperature" and should be identified as "influent temperature."

Response to PSEG Comment 5

This inadvertent error has been corrected in Section G.13.c.ii. as requested.

PSEG Comment 6, Part IV, E.1.e. (Discharge Requirements)

PSEG believes that the additives used in the steam plant and the non-radioactive liquid waste disposal system (DSN 48C), as recognized in the Fact Sheet on pages 11 through 13, should also be included in this section. These additives include ammonium hydroxide, hydrazine, and ethanolamine, which are used for corrosion control in the plant steam systems; sodium hypochlorite, hydrogen peroxide, sodium hydroxide, and a coagulant aid, which are used in the non-radioactive liquid waste disposal treatment system; and sodium hydroxide and sulfuric acid, which are used to regenerate demineralizers.

Response to PSEG Comment 6

This clarification has been incorporated in Specific Requirement E.1.e. as requested.

PSEG Comment 7, Part IV, E.4.d.

This section proposes that Ammonia-N sampling and analysis is required on "the effluent on the day a sample is collected for WET testing" without specifying a sample type. PSEG recommends that this sample type be clarified by specifying the following language: "The required ammonia-N analysis may be conducted on an aliquot of the acute toxicity testing composite sample."

Response to PSEG Comment 7

The Department agrees that this clarification is appropriate and will help to ensure that the ammonia test will be representative of the sample collected for whole effluent toxicity. This change to Section E.4.d. has been made.

PSEG Comment 8, Part IV, G.1.b.

This section requires that the flow rate for each individual circulating water pump shall be determined at least annually using a Rhodamine WT dye tracer evaluation ("the Tracer Evaluation"). PSEG believes that NJDEP intends that the Tracer Evaluation testing may be performed during any month of the calendar year, maintaining the schedule in the 1994 Permit. The example given uses dates, which could be interpreted to mean that the annual tracer evaluation is required in the same month each year. Requiring the testing in a single month could create an impossibility of performance if outages, pump maintenance, or other operational conditions rendered a given pump non-operational during the month specified for testing. The fifth sentence of this section should therefore be changed to delete the word "March". Therefore, PSEG recommends the following language: "For example, if the dye tracer evaluation was performed in March 2000 under the July 20, 1994 permit, the dye tracer evaluation under this renewal permit shall be performed in ~~March~~ 2001."

Response to PSEG Comment 8

The Department recognizes that outages, pump maintenance or other operational conditions may result in PSEG's being unable to perform annual Tracer Evaluation testing during the same month as which the test was performed in the previous year. The Department has modified the language in Section G.1.b. accordingly to address this comment, although the sentence including the example has been retained.

PSEG Comment 9, Part IV, G.2.a; Fact Sheet

This condition requires the permittee to conduct semi-annual training of its employees operating the screens to ensure awareness of the function of the screens in reducing mortality of aquatic life. PSEG requests that the Department make the training requirement "annual" instead of "semi-annual" to be consistent with the other training requirements for the individuals at the Station that will perform the work.

Response to PSEG Comment 9

The final permit requires semi-annual training to help improve the effectiveness of the Ristroph screens. In order to attain maximum effectiveness of the Ristroph screens, the Department has determined that it is necessary to stress to Station personnel operating the screens the importance of continued attention to the numbers of fish being impinged as well as the debris load. The training will be done early in the spring. It will also be done late in the fall, after the time of greatest impingement, so that station personnel can review the operation again to see what actions could be taken to improve biological efficacy. As such, item G.2.a. in the final permit specifies that training should be conducted semi-annually where the language in this item has been further clarified to describe the Department's intent.

PSEG Comment 10, Part IV, G.2.b; Fact Sheet

PSEG has concerns with some of the conditions detailed in Section G.2.b.i – iv. The observations in ESSA Technologies Ltd.'s "Review of Portions of New Jersey Pollutant Discharge Elimination System (NJPDES) Renewal Application for the Public Service Electric & Gas' (PSE&G) Salem Generating Station" (June 14, 2000) (hereafter, "ESSA Report") regarding possible enhancements to the fish return, are predicated on a misunderstanding of system operation and therefore, are erroneous. As explained in Section V.B.3 of PSEG's Response to the ESSA Report, the trauma and stress hypothesized by ESSA would not be experienced, and sampling fish at the point of discharge as ESSA suggests would be very difficult, if not impossible, given site-specific factors. Moreover, the results obtained would, in all likelihood, have the same uncertainties associated with the existing sampling system. It is premature to impose a requirement to redesign the fish return sluice prior to evaluating the study data.

PSEG also is concerned with the schedule required per Section 2.b.iii. PSEG can not propose a study design that is adequate to collect data on possible system enhancements for species and life stages of concern and conduct the studies within the schedule defined in the Draft Permit. PSEG is recommending an alternative that is predicated on its preparing a work plan that would include acceptance criteria to assure technically defensible and cost-effective actions.

PSEG has proposed language to address some of these concerns where this language is as follows:

b. Further Study and Enhancements

- i. ~~Fish mortality of the fish return system shall be evaluated independently from the Ristroph screens to determine mortality rates as fish re-enter the estuary. The permittee shall submit a ranking of best to worst (i.e., most vulnerable or frail) Representative Important Species (RIS) for which the Ristroph traveling screens are most effective at minimizing mortality.~~ In addition, impingement mortalities associated with the fish sampling pool shall be further investigated including ~~a comparison~~ an assessment of flow velocities and/or volume on fish survival for the fish return sluice ~~versus the impingement sampling sluice.~~ The permittee shall submit a ranking of best to worst (i.e., most vulnerable or frail) Representative Important Species (RIS) for which the Ristroph traveling screens are most effective at minimizing mortality.
- ii. Based on the results of G.2.b.i., the permittee shall submit a proposed ~~study and/or redesign of the fish return sluice and sampling pool where a biologist with expertise in the area of fish behavior shall specify flows, velocities, and depth profiles to minimize mortalities.~~ workplan for a study to determine ways to minimize the stresses associated with the fish return sluice and

sampling pool. Emphasis should be placed on reducing potential mortality of susceptible species.

- iii. PSEG shall submit the findings ~~and study to the Department regarding per G.2.b.i. and G.2.b.ii. above. Submit the special report: within 180 days from the effective date of the permit (EDP) to the Department within 180 days of the effective date of the permit (EDP) and the proposed work plan required in a.2.b.ii. within EDP + 270 days.-~~
- iv. Based on these findings, the Department may impose new requirements and impose an installation schedule of a modified fish return sluice and/or sampling pool. Any such requirements will be incorporated as a minor modification to the NJPDES permit.
- v. It is important to note that the Department is committed to requiring implementation of any cost-effective alternate intake protection technologies that will minimize impingement and/or entrainment effects based on the results of these studies.

Response to PSEG Comment 10, Part IV, G.3.a.i

PSEG has suggested deletion of the first sentence in item G.2.b.i.. Specifically, PSEG contends that it would not be possible to effectively sample fish as they “re-enter the estuary” from the fish return system. The Department has determined that it is necessary to assess this information. However, the Department recognizes that any study associated with independently assessing fish mortality as fish re-enter the estuary from the fish return sluice is complex. Therefore, the Department has moved this sentence to item G.b.ii., which allows this assessment to be included as part of a work plan thereby allowing the permittee additional time to consider these issues.

Regarding item G.2.b.ii, PSEG has suggested inclusion of an additional step, namely a work plan prior to performing a study for the information included in this item. The Department agrees that a work plan will improve the process. In fact, the Department routinely requires submission of a work plan as a first step to a technical study. However, the Department does not agree with PSEG’s suggested deletion of the words flows, velocities and depth profiles. The Department has determined that specific mention of these factors is appropriate and important in determining the factors that should be considered by PSEG as part of its work plan.

Regarding item G.2.b.iii., the Department has considered PSEG’s suggested changes but does not agree that such changes are warranted. PSEG has requested that the findings of item G.2.b.i. be submitted in EDP + 180 days and the work plan described in item G.2.b.iii. be submitted in EDP + 270 days. The Department has determined that the findings of item G.2.b.i. shall be submitted in EDP + 90 days and the work plan shall be submitted within EDP + 180 days. This is based on the premise that some or all of the information in item G.2.b.i. may already exist. Regarding the Work Plan described in item G.2.b.i., the Department has determined that EDP + 180 days is a sufficient amount of time to prepare a work plan.

Because the work plan will outline the conditions of the study, the Department has included additional language as item G.2.b.iv. Specifically, this language states that PSEG shall implement the study proposed in the work plan within sixty days of the Department’s approval. The Work plan shall also outline the time frames necessary for completion of the study and these time frames are subject to the Department’s approval. It is the Department’s intent to require completion of this study in an expeditious manner.

Regarding PSEG's suggested inclusion of language as indicated in this comment as item G.2.b.v., the Department has determined that this language is redundant given the content of the reopener language included in item G.10.a.

PSEG Comment 11

PSEG believes restricting the natural marsh grasses to be restored to just *Distichlis spicata* and *Juncus* spp. by the use of the abbreviation "i.e.," in item (2) of this item is not warranted, realistic, or do we believe intended by the Department. PSEG suggests using the abbreviation "e.g." to allow for the restoration of these species and other natural grasses.

Response to PSEG Comment 11

The Department agrees that its intent was to use the abbreviation "e.g." meaning "for example". This error has been corrected in Section G.3.a.i. as requested.

PSEG Comment 12, Part IV, G.3.c.ii.

The fifth sentence of this item requires the permittee to implement the Management Plan(s) not later than EDP + 3 years. PSEG contends that any requirement for completion of implementation of any Management Plan for replacement acreage, if any, cannot be tied to the effective date of the Permit. Should a determination be made at some point in the future that "replacement acreage is necessary," PSEG would develop a schedule for implementation of the associated Management Plan for review by the EEPAC and approval of the NJDEP.

Response to PSEG Comment 12

This language was copied from the original language included in the July 20, 1994 permit. The Department inadvertently carried over the date of "EDP + 3 years". The Department agrees that the implementation of any new Management Plans for Replacement Acreage cannot be tied to the effective date of the permit. Therefore, this requirement has been changed as requested in item G.3.c.ii. to state that implementation of the Management Plan shall be in accordance with a schedule approved by the Department.

PSEG Comment 13, Fact Sheet, Page 40

The Interim Vegetative Criteria dates and the Final Success Criteria dates within the Fact Sheet are incorrect and should be corrected as follows:

	Completion of Restoration <u>Implementation Action</u>	Interim Vegetative <u>Criteria</u> ¹	Final Success <u>Criteria</u> ¹
MRT	March 1998	October 2004	October 2009
Dennis	October 1996	October 2003	October 2008
Commercial	November 1997	October 2004	October 2009
Alloways	September 1999	October 2005	October 2011
Cohansey	September 1999	October 2005	October 2011
The Rocks	June 2000	October 2005	October 2011
Cedar Swamp	June 2000	October 2005	October 2011

¹ Criteria dates correspond with the end of the growing season of the appropriate year. The interim criteria at the salt hay farms are measured following a two-year lag period and five growing seasons. The interim criteria at the *Phragmites*-dominated sites are measured following a one-year lag and five growing seasons. The final success criteria at the salt hay farms are measured following a two-year lag period and twelve growing seasons. The final success criteria at the *Phragmites*-dominated sites are measured following a one-year lag period and twelve growing seasons. Data reports and

evaluations are not required until June 30 of the year following the year in which data is collected. For example, at the MRT site, the results of the October 2004 interim criteria will not be submitted until June 30, 2005.

Response to PSEG Comment 13

The Department notes these corrections and hereby incorporates this information into the Administrative Record.

PSEG Comment 14, Fact Sheet, Page 40

The percentages included for status of vegetative cover (i.e. Table 2) for The Rocks, Cedar Swamp, and Cohansey wetland restoration sites are correct; however, the percentages included for the Alloways site are incorrect. This table should read as follows:

Table 2 – Status of Vegetative Cover for Wetland Restoration Sites - (as of 1999)

***Phragmites*-dominated Wetland Restoration Sites**

	The Rocks	Cedar Swamp	Cohansey	Alloways
Desirable Vegetation without <i>Phragmites</i>	74%	40%	57.8%	26.6%
Desirable Vegetation with <i>Phragmites</i>	6%	24%	3.8%	12.9%
<i>Phragmites</i> -dominated Vegetation	11.1%	11.3%	10.1%	37.4%
Non-Vegetated Marsh Plain	5.6%	17.2%	20.4%	11.5%
Internal Water Areas	3.5%	7.5%	6.6%	11.3%
Open Water	0%	0%	1.2%	0.3%

Response to PSEG Comment 14

The Department notes these clarifications and hereby incorporates this information into the Administrative Record. As stated previously, the permittee is in compliance with the vegetative success criteria at all the EEP sites.

PSEG Comment 15, Fact Sheet, Page 40

The characterization that the Department "...settled on an approach which uses glyphosate application followed by a prescribed burn of the sprayed area" is not entirely correct. There have been no prescribed burns at any of the sites since 1997. In addition, since 1997, the permittee in cooperation with the Department has restricted the use of herbicides while developing a test area program to determine whether other methods for treating *Phragmites* are effective. Herbicide use since 1997 at the *Phragmites*-dominated restoration sites was less than that which should have been applied to achieve initial control. PSEG in cooperation with the Department chose to reduce herbicide application while awaiting results of the test area program. In fact, the test area program has been an integral part of the *Phragmites* restoration program. It has been reviewed by both the Department and the MPAC and is part of the Department-approved Management Plan for the Alloway Creek Watershed restoration site.

To clarify this issue, PSEG suggests that the Department include the following paragraph in its response to comments document:

Natural resource agencies with years of experience in attempting to eradicate *Phragmites* have come to regard the application of the herbicide, glyphosate (the active ingredient of Rodeo®), as one of the most effective means to eradicate *Phragmites*. Glyphosate is registered by the United States Environmental Protection Agency for use in an aquatic environment. After a careful and comprehensive review, the Department initially agreed on an approach, which uses glyphosate application followed by a prescribed burn of the sprayed area. While the Department approved a follow-up application of glyphosate, it is not intended to be a program of open-ended, perpetual herbicide application. The Department has supported PSEG's development of a test area program to evaluate alternative treatment methods for *Phragmites* control. The test area program is an integral part of PSEG's continuing efforts to restore *Phragmites*-dominated marshes. The Department continues to encourage minimization of the use of glyphosate on wetland restoration sites. Once the proper hydrological regime is established in an affected area, the Department's goal is for native wetland vegetation such as *Spartina alterniflora* to outcompete *Phragmites*.

Response to PSEG Comment 15

The Department agrees with these clarifications and hereby incorporates this information into the Administrative Record.

PSEG Comment 16, Fact Sheet, Page 42

The Total Acreage Creditable Towards Permit for the Commercial Upland Buffer should be "113" instead of the "123" listed in the Fact Sheet.

In addition, PSEG disagrees with the Department's decision to grant credit for the Cohansey River Watershed site at a 2:1 ratio. As demonstrated in G-2-17 of the March 1999, NJPDES Permit Application, *Phragmites* has expanded rapidly across many marsh areas in the less saline environments of the Delaware estuary. At the Cohansey River Watershed Site, *Phragmites* increased from 40.9 acres in 1962 to 420 acres in 1996 (see Table 1, G-2-17 of the Application). The expansion represents a ten-fold increase in *Phragmites* over approximately 30 years.

As detailed in G-2-6, *Phragmites* is an invasive plant that can adapt to a wide range of habitats. *Phragmites* has the ability to alter its own habitat to reduce stress and provide for its own expansion. Its dense culms and thick litter layer can act to slow water and enhance sediment deposition, increasing the elevations of the marsh plain and providing for a habitat conducive for its own growth and expansion. In addition, the ability of the plant to facilitate the movement of oxygen to rhizomes in anoxic environments further enhances its ability to rapidly expand within the marsh plain.

While *Phragmites* occupied 45% of the marsh plain in 1996, it is probable that it would have continued to expand rapidly throughout the marsh plain. Using the same rate of expansion occurring from 1962 to 1996 (7.3%/year), approximately 2/3 of the marsh plain would have been dominated by *Phragmites* vegetation in 2001 without treatment by PSEG. The rapid shift towards increased *Phragmites* coverage at the site was thwarted because of PSEG's restoration efforts. Had no restoration activities been undertaken, the progression towards an increased quantity of *Phragmites* would have continued. Subsequently, habitat losses would have mounted and the contribution of the site to the fishery resources of the Delaware Bay would have diminished. Given the documented biological and physiological ability of the plant to expand and the rapid expansion documented at the site, PSEG believes that full credit for the site is appropriate.

Response to PSEG Comment 16

The Department agrees that the total acreage for the Commercial upland buffer is 113 acres where the Department inadvertently specified an incorrect number of 123 acres.

The Department has determined that fifty percent credit is appropriate for the Cohansey site, While the Department agrees that *Phragmites* was expanding rapidly at this site, the fact remains that *Phragmites* coverage was about 45% of the site when PSEG began its restoration activities. Therefore, the Department has determined that the following acreage is currently creditable towards the permit requirements:

<u>Site</u>	<u>Total Acreage</u>	<u>Total Acreage Creditable Towards Permit</u>
Alloways: Wetlands	2813	2813
Alloways: Upland Buffer	220	73.33
Cohansey: Wetlands	910	455
Cohansey: Upland Buffer	145	48.33
Dennis: Wetlands	369	369
Dennis: Upland Buffer	15	5
MRT: Wetlands	1135	1135
MRT: Upland Buffer	108	36
Commercial: Wetlands	2894	2894
Commercial: Upland Buffer	339	113
Bayside Tract: Wetlands	2585	0
Bayside Tract: Upland Buffer	1822	607.33
The Rocks and Cedar Swamp	2599	2000
Other Delaware Sites	<u>1739</u>	<u>0</u>
TOTAL	17693 acres	10, 549 acres
 Other Lands Within Site Boundaries	1374	
Other DNREC Lands	<u>1452</u>	
	20,520 acres	

PSEG Comment 17, Part IV, G.3.d, G.6.a.i., Fact Sheet

Based on the language in the Fact Sheet, page 42, PSEG understands that the NJDEP is proposing by Specific Requirement G.3.d. to merge the existing advisory committees into a single committee. Since the proposed language states that the combined committee's purpose is "... to provide technical advice to the permittee . . . ,” PSEG requests that the Department change the name of the committee to the Estuary Enhancement Program Advisory Committee (“EEPAC”), as opposed to Estuary Enhancement Program Oversight Committee (EEPOC). This change is more reflective of the Committee's intended role as an advisory body in items G.3.d. and G.6.a.i. of Part IV.

Response to PSEG Comment 17

The Department agrees that this name change to “EEPAC” is more reflective of the Committee's role as an advisory committee and the name has been changed accordingly. This change is incorporated into Sections G.3.d. and G.6.a.i. of Part IV.

PSEG Comment 18, Fact Sheet, Page 37 and 51

PSEG notes the following misstatements on page 37:

- Dr. Shisler's company affiliation is incorrectly stated and should be replaced with "...Environmental Consultants, Inc.”

- The current MPAC includes a representative from USEPA Region II, Mario Del Veccario.

PSEG also notes the following misstatements on page 57:

- the Delaware River Basin Commission ("DRBC") is a member of the MAC;
- the Biological Monitoring Work Plan should be abbreviated as "BMWP";
- the Biological Monitoring Work Plan is noted as having been "...approved..." by the MAC. The 1994 Permit established the MAC to provide technical advice to PSEG; only the NJDEP has authority to approve the BMWP.

Response to PSEG Comment 18

The Department is in agreement with these observations and hereby incorporates this information into the Administrative Record.

PSEG Comment 19, Fact Sheet, page 52

The bottom paragraph states that the BMWP will be "approved" by the EEPOC. PSEG contends that only the Department has the authority to approve the BMWP. This is also consistent with the Fact Sheet, page 54.

Response to PSEG Comment 19

The Department agrees that the BMWP can only be approved by the Department and notes this misstatement. However, the Department will afford consideration to all comments or suggestions made by the EEPAC, as appropriate. This information is hereby incorporated into the Administrative Record.

PSEG Comment 20, Part IV, G.4.a. Fact Sheet

The Permit Specific Requirement and the Fact Sheet are correct in stating that PSEG has installed eight fish ladders; however, only five of these fish ladders were installed as requirements of the July 20, 1994 Permit. The three fish ladders at Coursey's Pond, DE; Garrison's Lake, DE; and Moores Lake, DE were installed under the provisions of a settlement agreement with the Delaware Department of Natural Resources and Environmental Control¹ and are not subject to the terms and conditions of the 1994 Permit.

In addition, the July 20, 1994 Permit required PSEG to conduct operational and maintenance activities of the five installed fish ladders during the term of the Permit and during any period of the time the Permit is extended pursuant to N.J.A.C. 7:14A-2.3. PSEG has complied and continues to comply with this Permit condition. PSEG has developed Operational and Maintenance Manuals for the installed fish ladders and has arranged for long-term operation and maintenance of these ladders to be conducted by the respective owner of each facility, with the exception of Sunset Lake. As the NJDEP has noted in the Fact Sheet, page 49, "As part of PSE&G's settlement with DNREC, it was agreed that after completion of the construction of the ladders in Delaware, DNREC would manage and maintain the ladders." The settlement agreement also provided DNREC with necessary funding for this maintenance responsibility.²

¹ Settlement Agreement between PSEG and DNREC (March 23, 1995) (hereinafter, "DNREC Settlement").

² Per Memorandum of Agreement dated July 1, 1999, based upon DNREC Spend-Down Plan dated January 29, 1999, approximately \$145,000 of the escrow fund was placed in a sub-

In New Jersey, a signed agreement between PSEG and the Camden County Department of Parks ("CCDP") transfers the responsibility of maintenance of the Cooper River Lake fish ladder to the CCDP. This agreement appears as Section 3 of the site specific Operation and Maintenance Manual. For the Sunset Lake fish ladder, no long-term maintenance agreement exists with the City of Bridgeton. PSEG acknowledges its responsibility for the maintenance of this fish ladder, and intends to continue to perform this activity.

The permit condition requiring PSEG to conduct routine maintenance and inspection of each facility is unnecessary and should be deleted from the Draft Permit. Furthermore, PSEG does not have the necessary legal authority to conduct long-term maintenance activities on property owned by others.

Therefore, PSEG is requesting that the language of this condition be modified to reflect these comments as follows:

- a. The permittee has installed eight fish ladders (five under the terms of the July 20, 1994 permit). The locations for these fish ladders are as follows: Sunset Lake, NJ; McGinnis Pond, DE; McColley's Pond, DE; Silver Lake, DE; Coursey's Pond, DE; Cooper River, NJ; Garrison's Lake, DE; and Moore's Lake, DE. ~~The permittee shall operate and maintain these fish ladders in accordance with the developed Operations and Maintenance Manuals. Routine maintenance and inspections shall be performed to ensure that the ladders are operating as designed. Inspection reports prepared as part of routine operations and maintenance shall be made available to the Department upon request.~~ The permittee shall provide formal notification to the ladder owner of any maintenance issues identified during the routine inspections. Routine inspections during the upstream adult migration period shall be performed to ensure that the ladders are operating as designed. Documentation concerning inspections and any maintenance issues shall be made available to the Department upon request.

Response to PSEG Comment 20

The Department does not object to PSEG's proposed changes with the exception of the deletion to the third sentence of item G.4.a. The Department has modified this sentence to read as follows in the final permit: "The permittee shall operate and maintain these fish ladders in accordance with the developed Operations and Maintenance Manuals or ensure that agreements exist that require other parties to be responsible for operations and maintenance." The Department has determined that this change is consistent with the intent of the language proposed in the December 8, 2000 draft permit renewal yet addresses the concerns posed by PSEG in this comment.

PSEG Comment 21, Part IV, G.4.b., Fact Sheet

If the proposed permit condition is intended to require the permittee to perform monitoring of juvenile passage, this is not a continuance of present activities; it would be a significant expansion to the present fish ladder monitoring program. Furthermore, as discussed during the June 2000 MAC meeting, monitoring for emigrating juvenile river herring at the fish ladder installations prior to successful establishment of an adult spawning run is premature and may result in additional mortality to the emigrating juveniles.

The permit condition should also be clarified to state that continued monitoring of upstream migrating adults will be required and that monitoring of emigrating juveniles may be required in the future in

account of the Delaware Marsh Management Trust to aid DNREC in "long term management and maintenance costs for these structures."

accordance with the provisions of Special Condition G.6.a and an approved BMWP. Therefore, PSEG is requesting that the language of this condition be modified to reflect these comments. Proposed language is as follows:

- b. The permittee shall continue to perform ~~juvenile and adult passage~~ monitoring of adult passage of river herring ~~in connection with at the five fish ladder sites installed under the terms of the July 20, 1994 permit and the three additional fish ladder sites in Delaware~~ where the monitoring results shall be included in the annual Biological Monitoring Program Report as required under G.6.a.iv.

For the record, PSEG would also like to update one number provided in Table 3B to the Fact Sheet. The number of river herring adults counted as passing up the McGinnis Pond fish ladder during 1999 should be 48 instead of 45 which is a final number and is therefore consistent with the Biological Monitoring Program 1999 Annual Report.

Response to PSEG Comment 21

The Department acknowledges that monitoring of juvenile passage was not required under the terms of the July 20, 1994 permit nor was it required under the Biological Monitoring Program. Nonetheless, the Department maintains that monitoring of juvenile passage is necessary and has retained this condition from the December 8, 2000 draft permit in the final permit, although it has deleted the statement that describes juvenile abundance monitoring as a continuation of current monitoring. Please note that Commentor 61 also expressed support for juvenile abundance monitoring in Comment 139. The Department agrees that it is most appropriate to dictate the schedule and methods for this monitoring as part of the Biological Monitoring Program as indicated in item G.6.a..

The Department notes the updated number for Table 3B of the Fact Sheet and hereby incorporates this information for the Administrative Record.

PSEG Comment 22, Part IV, G.4.c., Fact Sheet

Draft Permit Specific Requirement G.4.c. incorrectly implies that the number of juvenile herring to be produced in an impoundment can be predicted based on the number of upstream migrating adults entering each impoundment. This permit condition should be changed to reflect the available scientific data concerning the re-establishment of river herring spawning runs.

As stated in the PSEG Application (Application Appendix G, Attachment G-5, p. 53-54), the relationship between juvenile abundance and the number of spawning females is highly variable and unpredictable. Various relationships between juvenile abundance and spawning stock size and between juvenile abundance and adult returns have been reported (Havey 1973; Walton 1987; Jessop 1990a, b). Parent-progeny relationships have been demonstrated (Havey 1973), but they vary widely at different spawning escapement levels (Jessop 1990a). Juvenile production is density-dependent above certain escapement levels. For example, Walton (1987) presents data for Damariscotta Lake in Maine, where he calculated that the alewife run is supported by the escapement of 0.53 females per acre. Also, Jessop (1990b) found no significant relationship between an index of juvenile abundance and spawning stock size for alewife and blueback that migrated upstream past the Mactaquac. The wide range of juvenile recruits per spawner reported in the literature demonstrates the influence of other factors in determining juvenile production.

Juvenile abundance and impoundment size is a better representation of production because it is less variable than the relationship between juvenile abundance and the number of spawning females (Application Appendix G, Attachment G-5, Table 19). The permit condition should be re-written to

require stocking only until such time as a minimum of five adult herring per acre of impoundment successfully complete upstream migration into each impoundment³.

Therefore, PSEG is requesting that the language of this condition be modified to reflect these comments as follows:

- c. The permittee shall continue to stock the eight fish ladders installed until ~~such time as the number of adults using the ladder meets the minimum number of adults calculated per acre for the minimum production of juveniles (1005/acre).~~ at least five adult herring per acre of impoundment successfully complete upstream migration into each impoundment.

Response to PSEG Comment 22

The Department agrees that it erroneously included the goal of 1005 juveniles per acre as a fish stocking goal. The Department agrees that the goal of five adult herring per acre of impoundment is appropriate and has incorporated this change to item G.4.c.

PSEG Comment 23, Part IV, G.5.a., Fact Sheet

PSEG has concerns with some of the conditions detailed in Section G.5.a.i – iii of the Permit and the related sections of the Fact Sheet. Specifically, PSEG's concerns relate to the sound deterrent study, light attraction technologies, and the schedule for completion of the work. PSEG has provided extensive comment on the sound deterrent studies and the light attraction technologies in Section V. C and V. E. of the PSEG Response to the ESSA Report. PSEG contends that the light attraction technology should not be the subject of further study at Salem at the present time because there have been no studies conducted with full-scale light/pump systems for the RIS at Salem and the few studies cited by ESSA have limited application to Salem. Furthermore, it is unlikely that the light/pumping system would be biologically effective, reduce losses, or be feasible at Salem, particularly from a cost-benefit perspective (see PSEG's Response to ESSA Report, Section V.E.1.a.).

PSEG concurs that the technologies should be assessed collectively as a "system" that includes the existing Ristroph screens. However, PSEG is concerned with the schedule required per Section 5.a.iii. It may be impossible to implement a valid study within the time frame proposed in the draft permit, given the interannual variations in species presence and abundance in the vicinity of the Salem CWIS.

In summary, PSEG believes there is merit to assessing additional fish deterrent technologies presented in the Draft Permit. However, for the reasons stated, PSEG believes this condition should be modified in order to meet the study objectives (i.e., meaningful results within a practicable timeframe) where the modified language is as follows:

- a. Multi-Sensory Hybrid Intake Protection Technology: PSEG shall study the feasibility of: 1) strobe light technology; 2) air bubble technology; and 3) sound deterrent; ~~4) light attraction technologies such as mercury vapor light coupled with enhancements to the fish return system (e.g. fish pumps) to allow the fish to be returned to the estuary.~~ These technologies shall be studied individually as well as in various combinations as a hybrid system. The objective of this study is to minimize impacts to those species that do not survive well off the intake

³ NJDEP has correctly noted in the Fact Sheet, page 45, "The goal of the program was to achieve a total movement of at least five adult river herring per acre into each impoundment."

traveling screens as well as those species that are most affected by Salem's operations (as indicated by Conditional Mortality Rates). The concerns and limitations documented by ESSA in its report for the 1994 Cage Tests; 1998 Cage Tests; and the in-situ tests shall be considered in the development of any Plan of Study with regard to any sound deterrent technologies. ~~Also related to sound deterrents, far field attraction behavior or potential acclimation shall also be studied. Given these requirements, the permittee shall:~~

- i. Present a Plan of Study regarding the above technologies to the Department. Submit a description of planned activities: within 180 days from the effective date of the permit (EDP).
- ii. Not later than sixty days after receipt of the Department's approval of the Plan of Study, PSEG shall implement the Plan of Study in accordance with the schedule approved by the Department, subject to species availability.
- iii. ~~Not later than EDP + 36 months,~~ PSEG shall complete the Study identified in 5.1.ii. and file a report of the results to the Department in accordance with a schedule approved by the Department in the Plan of Study.

Response to PSEG Comment 23

The Department agrees that submission of a work plan will improve the process. The Department also agrees that the suggested deletion regarding light attraction technologies is appropriate. The Department notes that the ESSA report did not offer specific guidance or information to document the feasibility and potential effectiveness of mercury vapor light for the site-specific conditions of the Salem Station. However, the Department does not agree that the requirement to study of the potential far field attraction behavior or potential acclimation should be deleted and has retained this language in the final permit. The Department also does not agree with the suggestion that the timeline of EDP + 36 months should be deleted.

PSEG Comment 24, Part IV, G.5.b.

PSEG supports NJDEP's commitment regarding implementation of any cost-effective alternate intake protection technologies that will minimize impingement and/or entrainment effects based on the results of these studies. However, PSEG would subject any promising multi-sensory hybrid technology determined to be available for application at Salem to the same detailed evaluation and cost-benefit analysis applied to the other technology alternatives presented in Appendix F of the March 4, 1999 application.

Response to PSEG Comment 24

The requirement to study a multi-sensory hybrid system was implemented in the December 8, 2000 draft permit due in part to information included in the March 4, 1999 application which indicates a cost/benefit ratio of 7.0 for implementation of the strobe light/air bubble system. It is important to note that the Department, at this time, is only requiring study of a multi-sensory hybrid system whereas the cost/benefit ratio of 7.0 considers the full-scale operation and maintenance of an implemented system. However, based on the information provided in the March 4, 1999 application for the strobe light/air bubble system, the Department is confident that a multi-sensory hybrid system will meet the wholly disproportionate test where the costs are not wholly disproportionate to the benefits.

ESSA noted that the documentation for the cost/benefit analysis in the March 4, 1999 application could be improved upon. While the Department recognizes that a detailed cost/benefit test is not required as articulated on page 69 of the Fact Sheet accompanying the December 8, 2000 draft

permit, the Department expects PSEG to make adequate refinements to its documentation regarding the cost/benefit analysis in any subsequent submittals concerning intake protection technologies.

PSEG Comment 25, Part IV, G.6.a. and G.6.a.i. Fact Sheet

This item requires the permittee to develop and implement an improved biological monitoring program under the renewal permit. It is important to note that PSEG presented an improved Biological Monitoring Program ("BMP") at the Monitoring Advisory Committee ("MAC") meeting held on June 22, 2000. The proposed improvements to the program included increased impingement, entrainment, and bay-wide abundance monitoring. With the establishment of the EEPAC, PSEG anticipates submitting an improved BMP for review.

As addressed in PSEG Comment 21, PSEG disagrees that monitoring of juvenile river herring passage should be specified as a requirement for an improved BMP within Special Condition G.6.a. In addition, as discussed in PSEG Comment 17, the precise role and modified name of the EEPAC should be clarified in both G.6.a. and G.6.a.i.. Proposed language for item G.6.a. is as follows:

- a. The permittee shall develop and implement an improved biological monitoring program under this renewal permit. This biological monitoring program shall include, at a minimum: continued abundance monitoring for adult ~~and juvenile~~ passage of river herring as well as stocking in connection with the eight fish ladder sites; improved impingement and entrainment monitoring; review and discussion as to the appropriateness of the representative important species; improved bay-wide abundance monitoring; continued detrital production monitoring (including vegetative cover mapping, quantitative field sampling and geomorphology); continued study of the fish utilization of restored wetlands; and other special monitoring studies ~~as may be required by the Department and/or EEPOC [as may be recommended by the] EEPAC and/or the Department and subsequently required by the Department.~~ Additional special studies could include residual pesticide release monitoring for any replacement acreage deemed necessary under item G.3.c where details of this monitoring is described in Part IV of the July 20, 1994 permit. Until such time as an improved Biological Monitoring Program is developed and approved, the permittee shall continue in its monitoring efforts as specified in the existing (at the time of this renewal permit issuance) Biological Monitoring Program.

Response to PSEG Comment 25

The Department acknowledges that PSEG has already prepared an improved biological monitoring program prior to being required to do so as part of a NJPDES permit renewal action. It is expected that some or all of the improvements specified in this program and already presented to the MPAC and MAC will be incorporated as part of the improved biological monitoring program to comply with item G.6.a. of Part IV. It is also possible that the MAC may recommend additional improvements to the biological monitoring program which will be considered by the Department. Please refer to Response to PSEG Comment 21 concerning the Department's determination with regard to juvenile abundance monitoring.

The Department also acknowledges that the EEPAC's role is to provide advice and special monitoring studies can only be required by the Department. Therefore, the Department has incorporated PSEG's suggestions with respect to the second sentence of this item.

PSEG Comment 26, Part IV, G.6.a.ii., Fact Sheet

PSEG believes the word "Instream" as included in this Special Condition G.6.a.ii. is a typographical error and was intended to read: "improved."

In addition, PSEG contends that the specified schedule for submitting an improved Biological Monitoring Program Work Plan (BMWP) is inappropriate, given the requirement to obtain the advice of EEPAC prior to submitting the BMWP to the Department. PSEG proposes modifying the specified due date from 90 days to 270 days of the effective date of the permit (EDP). A submittal at EDP +270 days allows sufficient time for the establishment of the EEPAC (as required under Special Condition G.3.d.ii.) and receiving the EEPAC's technical advice on the improved Biological Monitoring Work Plan. The time frame PSEG proposes also allows an appropriate amount of time for NJDEP to review and act upon PSEG's submission of proposed EEPAC members, convene the Committee, and consider and incorporate, as appropriate, EEPAC's comments.

Response to PSEG Comment 26

The Department notes this error at Section G.6.a.ii. and has corrected it. The Department agrees that the establishment of the EEPAC and subsequent review of the biological monitoring program workplan by the EEPAC necessitates the schedule specified has merit and has incorporated this change to Section G.6.a.ii.

PSEG Comment 27, Part IV, G.6.a.iii. and G.6.a.iv., Fact Sheet

PSEG believes that the inclusion of the sentence "Contemporaneous with submission of said results to the Department, the permittee shall forward the results to each member of the EEPOC for technical review" in item G.6.a.iii is a typographical error. This requirement would be more appropriate as a component of Special Condition G.6.a.iv and should be included here.

Response to PSEG Comment 27

The Department agrees that it is more appropriate to include this sentence in Section G.6.a.iv. As such, these changes have been made to Sections G.6.a.iii. and G.6.a.iv.

PSEG Comment 28, Fact Sheet, page 54

The Department is asking PSEG to consider the inclusion of Atlantic silverside and Atlantic menhaden as RIS for the purposes of Section 316(a) and 316(b) of the Clean Water Act. PSEG believes the inclusion of additional species to Salem's RIS list is unwarranted. Specifically, USEPA's "Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500" (hereafter "USEPA 1977," page 17), states that: "... since all species which are critical, representative, etc. cannot be studied in detail, some smaller number ... may have to be selected." The USEPA also states that in selection of critical aquatic organisms for intake studies the following should be considered: commercially or recreationally important; threatened or endangered; critical to the structure and function of the ecological system; potentially capable of becoming a nuisance species; necessary in the food chain; and high potential susceptibility to impingement or entrainment. (USEPA 1977, page 16) Furthermore, the statement is made "...Often, but not always, the most useful list would include mostly sensitive, fish, shellfish, or other species of direct use to man..." The Application (Appendix F, III.D., Appendix C, Attachments C-1 through C-14, Species Specific Reports, Appendix E, VI.D.2 and Table VI-4) provides details on the criteria and rationale for the selection of the 12 RIS for Salem. The selected RIS definitely meet the criteria listed by USEPA (1977).

To the extent the Department chooses to reconsider adding to the RIS list, PSEG believes it would also be appropriate to consider deleting those species that have minimal involvement with the Station.

Response to PSEG Comment 28

As stated on page 54 of the Fact Sheet, the Department states "Given that populations of representative important species are subject to many changing factors over time, the Department is

hereby requiring the permittee to include a discussion as to the appropriateness of the representative important species (RIS) in its improved biological monitoring program for the purposes of Section 316(a) and Section 316(b) of the Clean Water Act. Consideration should be given to the appropriateness of the existing RIS as well as the possible inclusion of atlantic silverside and atlantic menhaden”.

The Department has reviewed available information concerning this issue and has determined that further consideration of Atlantic menhaden as an RIS is not necessary. However, the Department maintains that further consideration of Atlantic silverside as an RIS is appropriate and has retained such language in the final permit decision.

PSEG Comment 29, Fact Sheet, Page 57

In the last bullet the wording implies that PSEG would be required to implement special monitoring studies “recommended” by EEPAC. It is suggested that this sentence be reworded to: “-other special monitoring studies as may be recommended by the EEPAC and/or required by the NJDEP and subsequently required by the Department.”

The last paragraph on page 57 of the Fact Sheet is inconsistent with the Permit Condition IV.G.6.a.i and G.6.a.ii. Specifically, it calls for a distribution of a proposed BMWP to the NJDEP and EEPAC by EDP + 3 months. The Part IV term is EDP + 90 days.

Response to PSEG Comment 29

The Department agrees with these suggested clarifications to the Fact Sheet and hereby incorporates this information to the Administrative Record.

PSEG Comment 30, Part IV, G.7.a., G.7.b., and G.7.c.

PSEG proposes the use of the phrase “conditions permitting”, which is contained in the current Biological Monitoring Work Plan, as opposed to “weather conditions permitting”. This is more appropriate for in-plant sampling and appropriately takes equipment availability into account.

PSEG also proposes that the reference in proposed Specific Requirement G.7.b to a minimal sampling frequency of “three times per week” be changed to “three days per week.”

Finally, PSEG proposes that proposed Specific Requirement G.7.c include an additional phrase at the end to state “or as established in the Biological Monitoring Program Work Plan, approved by the Department.” PSEG believes this flexibility is necessary since the specific requirements of the BMWP are not defined presently and their scope may dictate an alternative date for submission of monitoring reports.

Response to PSEG Comment 30

The Department has added the statement “weather and operational conditions permitting” to Sections G.7.a. and G.7.b. to address the first issue. The Department has also modified Section G.7.b. to “three days per week” to be consistent with Section G.7.a. Lastly, the Department has included the suggested additional phrase to Section G.7.c. to provide for flexibility if needed.

PSEG Comment 31, Part IV, G.8.a., Fact Sheet

Specific Requirement G.8.a. proposes to require PSEG to supplement the analysis of losses provided in the March 4, 1999 NJPDES Permit Renewal Application with additional information as recommended in the ESSA Report (Fact Sheet, page 72). Regarding Specific Requirement G.8.a., seven specific objectives of this analysis are specified. As discussed in PSEG’s Response to the

ESSA Report and summarized below, PSEG maintains that the results and conclusions it presented in the Application are valid and that the large majority of ESSA's recommendations would not produce information that would materially affect NJDEP's review of PSEG's Application.

PSEG's specific comments on each supplemental analysis listed in Specific Requirement G.8.a. (and reproduced below) are as follows:

1. The biomass lost to the ecosystem should be calculated either using a slightly modified version of the production foregone model for all RIS or the spreadsheet approach;

As discussed in PSEG's Response to the ESSA Report (Sections VII.B and VII.C), ESSA's method for estimating biomass lost to the ecosystem produces results that are biologically meaningless. Therefore, PSEG believes that computing estimates using the methods described in Section 5.2.3 of the ESSA Report (using either a modified version of the production foregone model or ESSA's spreadsheet) would not serve any useful purpose. However, PSEG recognizes the Department's need to address recommendations of its consultant that may produce information relevant to the NJDEP's review of PSEG's Section 316(b) Demonstration.

2. The contribution of RIS other than Bay Anchovy to the forage available for commercial and recreationally important species should be examined;

ESSA's contention that "including the contribution of RIS other than bay anchovy to the forage available for commercially and recreationally important species ... has the potential to significantly increase the estimates of lost revenue in the fishery" is incorrect. As described in PSEG's Response to the ESSA Report (Section VII.C.), inclusion of this component from ESSA's method of estimating biomass lost to the ecosystem would not materially affect the results of the benefits assessment. The reason that inclusion of this component would not "significantly increase" estimates of pounds lost to the fishery (and hence revenue) is because the forage biomass must be converted into predator biomass before it is available to the commercial or recreational fishery. That transfer from forage to predator biomass results in a loss of roughly 90% of the biomass (i.e., assuming a 10% trophic transfer efficiency). Also, the forage biomass must be allocated among a range of predator species, some of which are not recreationally or commercially important. Therefore, only a small fraction of the contribution of RIS to forage actually would become biomass of the recreationally and commercially important species.

However, PSEG recognizes the Department's need to address recommendations of its consultant that may produce information relevant to the NJDEP's review of PSEG's Section 316(b) Demonstration.

3. A more detailed analysis of the levels of uncertainty in the production and catch foregone estimate needs to be considered;

As discussed in PSEG's Response to the ESSA Report (Section VII.C.5), ESSA commented that because there is some uncertainty in estimates, the estimates should be presented with confidence intervals and ranges derived from sensitivity analyses. However, ESSA does not explain the purpose of the recommended uncertainty analyses, how the uncertainty analyses should be conducted, what the output of the analyses should produce, or how the output would be useful to NJDEP in its permit decision-making.

PSEG acknowledges that uncertainties exist, as they generally do in estimates based on environmental monitoring data. However, PSEG's position is, and has been, that the permit decision-making process is best served by consideration of the *best* estimates reasonably attainable, derived

through the application of scientifically defensible analytical methods using the best available data. The findings presented in the Application were developed accordingly, and PSEG continues to advocate this approach.

Furthermore, in recognition of underlying uncertainties, PSEG deliberately chose methods for estimating pounds lost to the fishery (referred to by ESSA as “catch foregone”) that would err on the side of producing overestimates so that estimated benefits associated with technology alternatives would tend to be overstated, and not understated. Because PSEG’s methods for estimating pounds lost to the fishery do not account for the effects of compensatory mortality and growth, and the effects of alternative energy pathways within the estuarine food web, the estimates are likely biased high. For these reasons, PSEG does not believe implementing ESSA’s recommendation is necessary, and does not believe implementing it would produce meaningful information. However, PSEG recognizes the Department’s need to address recommendations of its consultant that may produce information relevant to the NJDEP’s review of PSEG’s Section 316(b) Demonstration.

4. The estimates used for the survival rates of Age 0 - Blueback Herring used in the Appendix F-4 analysis (Application Appendix F, Attachment F-4) should be reviewed given the different values used in Appendix G-6;

PSEG has reviewed the survival rate estimates for age 0 - blueback herring used in the Appendix F-4 analysis and present in Appendix G-6 and found no inconsistencies. As discussed in PSEG’s Response to the ESSA Report (Section VII.C.4.c), ESSA mistakenly assumed that the annual survival rates for blueback herring presented in Attachment G-6, Table 6 reflected natural mortality only. In fact, they included both natural mortality and fishing mortality. Moreover, ESSA erred in its calculation of a daily mortality rate for age 0 blueback herring (presented in Table 5.14 of the ESSA Report) from the value presented in Attachment G-6. ESSA’s conclusion, “For blueback herring the different values chosen for age 0 survival are critical. This difference has a large effect, increasing both catch and production foregone of blueback herring by 14 times,” was clearly erroneous and resulted from a misinterpretation of PSEG’s analyses.

PSEG believes it has fully addressed this recommendation by ESSA and consequently the Department’s proposed Specific Requirement in its Response to the ESSA Report. PSEG requests that this proposed component be deleted from Specific Requirement G.8.a.

5. The base case entrainment and impingement mortality estimates should be compared against the historical averages to ensure consistency;

As recommended by ESSA, PSEG has compared the Base Case (see Application Appendix F, Attachment F-4) and historical entrainment and impingement loss estimates and found no inconsistencies.

As discussed in PSEG’s Response to the ESSA Report (Section VII.C.3.b), ESSA’s review did not consider the effects of inter-annual variability in the vulnerability of weakfish and white perch eggs to entrainment. Because white perch spawn up-river of the Station, and weakfish generally spawn down-river of the Station, entrainment losses of eggs are not observed in all years. The greatest annual loss estimates during the Base Case years (1991-1998) for weakfish and white perch eggs were for 1998. Since the Base Case scenario includes scheduled spring outages, and no spring outages occurred in 1998, the Base Case water withdrawals were less than the historical water withdrawals during some periods in the spring (when weakfish and white perch eggs are subject to

entrainment). Therefore, the Base Case loss estimates for weakfish and white perch eggs were lower than the estimates for historical conditions.

Likewise, ESSA's Report did not consider the effects of improved impingement survival for white perch on the modified intake screens. The reason the ratio is less than one for white perch adults is that the losses of white perch adults are due to impingement. The historical loss estimates for impingement were based on the impingement mortality rates for the old intake screens for all years prior to 1996, and on the impingement mortality rates for the new intake screens for 1996 through 1998. For the Base Case scenario impingement mortality rates for the new intake screens were used. The estimated impingement mortality rate for adult white perch is much lower for the new intake screens than for the old intake screens (Application Appendix L, Tab 10 and Application Appendix F, Attachment F-4, Table 3). Therefore, the Base Case scenario losses for 1991-1995 are substantially lower than the corresponding historical losses, and the Base Case scenario losses for 1996-1998 are higher than the corresponding historical losses.

The Base Case scenario is intended to represent future operating conditions and are the appropriate losses for use in any Cost-Benefit analyses of alternate intake technologies.

PSEG believes it has completed the analyses required by this component of the Specific Requirement and is submitting the results to the Department as part of its Response to the ESSA Report (Section III). Accordingly, PSEG requests that this component be deleted from Specific Requirement G.8.a.

6. Projected increases in RIS abundance should be included in the estimates of catch and production foregone;

As discussed in PSEG's Response to the ESSA Report (Section VII.A.2.b.), ESSA's recommendation to include projected increases in RIS abundance in estimates of catch and production foregone is without merit and contrary to other ESSA recommendations to reduce uncertainty in these analyses. This recommendation is apparently based on ESSA's belief that stocks have exhibited increases in abundance in recent years and will continue to increase in abundance in the future. It is surprising that ESSA (so concerned about uncertainties in PSEG's analyses) would recommend alternative analyses that require predicting the future, which surely must involve more uncertainty than simply characterizing the past.

PSEG did not present any quantitative projections of future RIS abundance in the Application, and ESSA provided neither estimates of projected increases in RIS abundance, nor any suggestions on how projected increases should be computed. In the absence of scientifically valid estimates of "projected increases in RIS abundance," PSEG views this recommendation as a theoretical exercise that would serve no useful purpose in the context of the Application.

Notwithstanding PSEG's Response to the ESSA Report, PSEG recognizes the Department's need to address recommendations of its consultant that may produce information relevant to the NJDEP's review of PSEG's Section 316(b) Demonstration.

7. The potential to customize intake protection strategies to minimize the impact of the plant on catch foregone and the biomass lost to the ecosystem should be further investigated.

As discussed in PSEG's Response to the ESSA Report (Section VII.A.2.b.), ESSA's recommendation and this component of Specific Requirement G.8.a to "customize intake protection strategies to minimize the impact of the plant on catch foregone and the

biomass lost to the ecosystem” with no reference to costs or to benefits associated with the biomass lost is inconsistent with requirements regarding decisions under Section 316(b) stated by the Department on page 69 of the Fact Sheet.

Furthermore, as discussed in PSEG’s Response to the ESSA Report (Sections VII.A and VII.B), ESSA’s method for calculating total biomass loss is severely biased because it does not account for the effects of density-dependent compensation, or the effects of alternative energy pathways within the ecosystem. Total biomass lost to the ecosystem (even if correctly calculated) does not translate directly into dollars for use in a Cost-Benefit analysis, and should not be a basis for decision making.

PSEG has used a pounds lost to the fishery approach to evaluate alternative intake technologies and to support the Cost-Benefit analysis. In addition, PSEG provided supplemental information and analyses to the Department, based on pounds lost to the fishery estimates of pounds lost to the fishery or catch, to further evaluate potential biases in benefit estimates associated with the Week 21 refueling outage schedule (Attachment II.B.1). This relevant supplemental information was not submitted to the Department at the time ESSA completed its review of PSEG’s Section 316(b) Demonstration. Specific Requirement G.5 of the proposed Draft Permit also requires further study of intake protection technologies and an evaluation of their cost-effectiveness. Consistent with PSEG’s Application, this required evaluation of cost-effectiveness in Specific Requirement G.5 will use a pounds lost to the fishery approach.

For these reasons, PSEG believes that it has already addressed one component of ESSA’s recommendation and will address the remaining component via compliance with Specific Requirements G.5., assuming it is included in the draft permit. Accordingly, PSEG requests that this component be deleted from Specific Requirement G.8.a.

In sum, PSEG has requested deletion of items 4, 5, and 7 of Specific Requirement G.8.a. as well as other language modifications. Therefore, PSEG is proposing the following language:

G.8.a. Analysis of Losses at the Station - The analysis of losses at the Station shall be supplemented with additional information recommended in the June 14, 2000 ESSA Report. ~~The objectives of this analysis shall be as follows:~~ PSEG shall prepare a work plan for NJDEP approval that shall address the following: 1) The biomass lost to the ecosystem ~~should be calculated either using a slightly modified version of the production foregone model for all RIS or the spreadsheet approach;~~ 2) The contribution of RIS other than Bay Anchovy to the forage available for commercial and recreationally important species ~~should be examined;~~ 3) A more detailed analysis of the levels of uncertainty in the production and catch foregone estimate ~~needs to be considered;~~ 4) ~~The estimates used for the survival rates of Age 0 Blueback Herring used in the Appendix F, analysis (Application Appendix F, Attachment F 4) should be reviewed given the different values used in Appendix G-6;~~ 5) ~~The base case entrainment and impingement mortality estimates should be compared against the historical averages to ensure consistency;~~ 6) ~~Projected increases in RIS abundance should be included in the estimates of catch and production foregone;~~ and 7) ~~The potential to customize intake protection strategies to minimize the impact of the plant on catch foregone and the biomass lost to the ecosystem should be further investigated)~~ and 4) Projected increases in RIS abundance should be included in the estimates of catch and production foregone. PSEG shall consider ESSA recommendations relative to these issues in the development of the Work Plan.

Response to PSEG Comment 31

The Department agrees that PSEG in its Response to the ESSA Report has adequately addressed ESSA's comments regarding Age-0 blueback herring survival rates (item 4), and the consistency of base-case and historical entrainment and impingement mortality estimates (item 5). Regarding item 7, the Department recognizes that information regarding impingement and entrainment effects are broken down by RIS upon submission of any studies concerning alternate intake protection technologies and their associated costs and benefits. Therefore, it is redundant to include this item as a separate study.

The Department continues to believe that a scientifically valid assessment of biomass lost to the ecosystem (included above as item 1, where items 2, 3, and 6 are components of this analysis) constitutes an important and necessary addition to the overall assessment of the effects of Salem on the Delaware Estuary. In sum, the Department has retained these four items in the final permit in item G.8.a. However, the Department acknowledges PSEG's concern regarding the appropriateness of ESSA's method for estimating biomass lost to the ecosystem.

PSEG Comment 32, Part IV, G.8.b.ii., Fact Sheet

PSEG employed a number of steps to ensure minimization of errors and biases in natural mortality rate estimates, including: (1) a complete review of the available literature on natural mortality rates for each life stage of each RIS; (2) a review of preliminary estimates by recognized scientists from academia; and (3) use of the life-cycle balancing procedure. ESSA's claim that natural mortality rates used by PSEG systematically overestimated the true values of these parameters is false as demonstrated in Section IV.D.3 of PSEG's Response to the ESSA Report.

PSEG questions ESSA's request for uncertainty analyses. PSEG acknowledges that uncertainties exist; however, PSEG's position, which is supported by applicable USEPA guidance, is, and has been, that the permit decision-making process is best served by consideration of the *best* estimates reasonably attainable, based on the best available data and on scientifically defensible analytical methods. The findings presented in the Application were developed accordingly, and PSEG continues to advocate this approach. PSEG's scientific response to the underlying recommendation is set forth in Section IV.D of the PSEG Response to the ESSA Report. Notwithstanding PSEG's Response to the ESSA Report, PSEG recognizes the Department's need to address recommendations of its consultant that may produce information relevant to the NJDEP's review of PSEG's Section 316(b) Demonstration.

Response to PSEG Comment 32

The Department notes PSEG's disagreement regarding ESSA's suggestion and has considered PSEG's comments regarding ESSA's recommendations. Despite PSEG's objections, the Department believes the additional analysis will be helpful and is maintaining the requirement in the final permit.

PSEG Comment 33, Part IV, G.8.c Fact Sheet

Providing a quality product that addresses the issues and recommendations identified by ESSA in items G.8.a. and G.8.b. will require a substantial effort and, therefore, considerable time. PSEG proposes to cooperatively develop for submission a Work Plan for these additional analyses. PSEG proposes to conduct the additional analyses in accordance with the schedule provided in the Work Plan. PSEG requests that any final Specific Requirement provide for submission of the supplemental analyses in accordance with the schedule defined in the Department approved Work Plan. Therefore, PSEG has proposed the following language:

G.8.c. The analyses specified in items G.8.a. and G.8.b. shall be provided to the Department ~~in EDP + 6 months~~ in accordance with the schedule defined in the Department approved Work Plan. Based on the fact that ESSA did not recommend wedgewire screens, dual-flow fine mesh screens, modular inclined screens, and a retrofit with a new closed-cycle cooling system, a revised fisheries analysis will not have a bearing on the inclusion of the above referenced alternate intake protection technologies at this time.

- i. The permittee shall submit to the Department for approval a Work Plan including those supplemental analyses and additional information listed in G.8.a and G.8.b. above. The Work Plan shall be submitted to the Department within EDP + 9 months and shall include a schedule for completion of the analyses.
- ii. Not later than sixty days after receipt of the Department's approval of the Work Plan, the permittee shall implement the Work Plan. The Work Plan is automatically incorporated as a condition of this permit upon final approval by the Department.

Response to PSEG Comment 33

The Department agrees that submission of a work plan will improve the process and routinely requires submission of work plans as a first step to a technical study as part of its regular policy. The Department also agrees that it is important to ensure a quality product. Therefore, the Department has incorporated these changes to item G.8.c, G.8.c.i. and G.8.c.ii. as requested.

PSEG Comment 34, Part IV, G.9.a.i. and G.9.a.ii., Fact Sheet

Consistent with the language in the specific permit requirement, PSEG requests that in the heading for Specific Requirement G.9.a. that the term "Intakes" be replaced with the term "Intake."

PSEG understands that the special study requested in item G.9.a.i. is primarily based on ESSA's comment related to the possible significance of small scale eddies in the vicinity of the cooling water intake structure with regard to concentrated entrainment of organisms (G.9.a.i.). Likewise, PSEG understands that the special study requested in item G.9.a.ii is primarily based on ESSA's comment related to the flow distribution across the intake bays. PSEG responded to ESSA's concerns in its Response to the ESSA Report at Section IV.B.3. However, PSEG will submit a report to the Department on this condition within EDP + 180 days as discussed in PSEG Comment 28.

Response to PSEG Comment 34

The Department has changed the term "Intakes" to "Intake" in Section G.9.a.i. as PSEG has requested.

Regarding the second and third issues raised in this comment, the Department notes PSEG's disagreement regarding ESSA's suggestions for these two subjects. However, since PSEG did not request any changes to the permit conditions as a result of this comment, no changes to the permit have been made or are deemed necessary.

PSEG Comment 35, Part IV, G.9.a.iii., Fact Sheet

Bathymetric charts (e.g. National Oceanic and Atmospheric Administration) provide low spatial resolution in Sunken Ship Cove while more detailed bathymetric information near the CWIS, discharge, and Sunken Ship Cove was collected and examined in previous studies conducted for PSEG. However, PSEG will submit a report to the Department on this condition within EDP + 180 days. PSEG has proposed the following language to indicate that other relevant hydrodynamic data is available:

- iii. The bathymetric chart of the area and other relevant hydrodynamic data should be examined to determine the potential for a strong back eddy during the ebb in Ship Wreck Bay [sic] immediately to the south of the intake. If such an eddy exists, it will be observable from shore and from the air when the ebb current is at a maximum. The chart and other relevant hydrodynamic data may also provide insight ~~in to~~ into the flow field entering the dredged channel from the side.

Response to PSEG Comment 35

The Department has incorporated these changes to Section G.9.a.iii to allow consideration of other relevant and available hydrodynamic data.

PSEG Comment 36, Part IV, G.9.b.i., Fact Sheet

The present impingement and entrainment sampling programs, as conducted in accordance with the NJDEP approved BMWP, are designed to account for potential variability in organism abundance associated with diel and tidal stage effects. The improved biological monitoring program developed in accordance with the proposed Special Condition G.6.a. will include components that address future impingement and entrainment sampling. As PSEG discussed with the NJDEP and the MAC on June 22, 2000, it is PSEG's intent to increase the number and frequency of samples for both programs to improve the precision of the estimates based on the sampling results.

Issues relating to the zone of entrainment and the flow hydrodynamics in the region of the intake have been addressed in the above response to PSEG Comments 34 and 35. The entrainment sampling program is designed to estimate the density of organisms that actually pass through the cooling water system, regardless of the entrainment zone, tidal stage, wind patterns or other factors. By sampling during all diel and tidal stages at an increased frequency, the proposed future program will provide estimates of impingement and entrainment density that account for variability relating to these and other potential factors. PSEG, therefore, requests that the second sentence of this proposed Special Condition be deleted.

Response to PSEG Comment 36

The Department recognizes that PSEG has proposed significant increases to its sampling frequencies of the impingement and entrainment program as discussed in PSEG Comment 25. These increased sampling frequencies will ensure a more representative database given varying flow patterns and hydrodynamics. However, based on ESSA's recommendation, the Department agrees that it is important to consider the results of the hydrodynamic study in assessing and interpreting impingement and entrainment results. Therefore, this sentence has been retained in the final permit.

PSEG Comment 37, Part IV, G.9.b.ii., Fact Sheet

The proposed Specific Requirement G.9.b.ii of the Draft Permit is based on the recommendations of ESSA and states "Alternative entrainment sampling methods with less process error shall be investigated." As discussed in PSEG's Response to the ESSA Report, PSEG is aware of the potential "process errors" associated with entrainment sampling and applied correction factors to account for these effects. The ESSA Report, in fact, states, "...the authors of the Application are aware of these difficulties and have done a good job of trying to account for them...." See PSEG Response to the ESSA Report at Section IV.B.

The potential process errors addressed by the proposed Specific Requirement are not unique to PSEG's entrainment sampling program and highlight issues faced by all scientists involved in estimating the abundance of small, fragile, life stages of aquatic organisms. The improved Biological Monitoring Program developed in accordance with the proposed Specific Requirement G.6.a. will

include components that address future entrainment sampling. As PSEG discussed with the NJDEP and the MAC on June 22, 2000, it is PSEG's intent to increase the number and frequency of entrainment samples to reduce variability in the sampling results.

Further efforts to address potential "process errors" associated with estimating entrainment abundance would require the conduct of an elaborate and lengthy study program. Such a study would be constrained by the availability of the appropriate species and life stages. This study would also require the development and testing of new sampling equipment. Proper conduct of such a study on potential methods to further address potential "process errors" would, therefore, require two seasons of ichthyoplankton abundance sampling.

PSEG requests that this proposed Specific Requirement be modified to allow sufficient time for development of a detailed study plan and to allow two spring-summer seasons for completion of such a study. This proposed language is as follows:

- ii. Alternative entrainment sampling methods with less process error shall be investigated. PSEG shall submit a Plan of Study for evaluating alternative entrainment sampling methods within EDP + 6 months.

Response to PSEG Comment 37

The Department recognizes that a study of this type is subject to many environmental variables. As such, the Department agrees that a longer study across two spring-summer seasons will result in more meaningful results; therefore, this change to Section G.9.b.ii. has been incorporated.

PSEG Comment 38, Part IV, G.9.c., Fact Sheet

As addressed in PSEG's comments on proposed Specific Requirement G.9.ai and G.9.b., PSEG proposes that the Study of the Hydrodynamics (G.9.a.i.) and the Study of Enhancements to Entrainment and Impingement Sampling (G.9.b.) be two different programs with the latter program conducted in accordance with a Plan of Study approved by the Department. PSEG, therefore, requests that the Department separate the reporting requirements for these two studies to reflect the different schedules.

With respect to the proposed Study of Hydrodynamics, PSEG suggests that this Specific Requirement be modified to require presentation of the findings within EDP +180 days.

Proper conduct of the Study of Enhancements to Entrainment and Impingement Sampling cannot be completed until approximately 30 months following Department approval of a Plan of Study. PSEG therefore requests that this Specific Requirement be modified to allow sufficient time to conduct a meaningful study.

Therefore, PSEG proposes the following language replace G.9.c.:

- G.9.c.i. PSEG shall present its findings regarding the Study of the Hydrodynamics at the Intakes of the Plant to the Department within EDP + 180 days.
- G.9.c.ii. PSEG shall present its findings regarding the Study of Enhancements to Entrainment and Impingement Sampling to the Department within 30 months following receipt of the Departments' approval of the Plan of Study.

Response to PSEG Comment 38

The Department agrees that these changes will result in a more meaningful study. Changes have been made to Section G.9.c.i. and G.9.c.ii. as requested.

PSEG Comment 39, Part IV, G.10.a.

Only the special conditions (i.e., G.2 through G.9 and G12b) that address biological studies related to impact assessment should be sent to the Director, Division of Fish and Wildlife. This language should be modified accordingly.

Response to PSEG Comment 39

The Department agrees and has made the suggested change to Section G.10.b. Please note that as discussed in Response 120, the Department has incorporated a separate intake protection technology reopener clause as item G.10.a.

PSEG Comment 40, Part IV, G.12.b., Fact Sheet

PSEG agrees with the Department that, although an “acceptable common metric” for quantifying all of the increased production from marsh restoration and the re-establishment of river herring runs is not presently available, it is important to consider the available evidence relevant to assessing the fish production benefits of these measures. PSEG’s Permit Renewal Application contains considerable data and information that demonstrate the marsh restoration and fish ladder installations have and will continue to provide substantial contributions to production in the estuary.

Inclusion of any Specific Requirement in the Final Permit that would require PSEG to estimate overall fish production from the wetland restoration sites and the fish ladders; however, must be framed and implemented in accordance with the Department’s consistent regulatory approach relative to the incorporation of the conservation measures in the 1994 Permit and its subsequent interpretation of that condition.

As stated by the Department in the Fact Sheet accompanying this Draft Permit, “PSEG was not required to estimate fish production at its wetland restoration sites as part of the July 20, 1994 permit” (Fact Sheet, page 77). As quoted in the Fact Sheet, page 77, the Department’s 1994 Response to Comments document issued with the Permit stated that “The Permittee would not be required to demonstrate how many fish of each species have been generated from the restored wetlands [and that] such a demonstration would not be practicable given the many environmental variables that influence fish populations in the Delaware estuary” (page 45). PSEG concurs with the Department’s previously stated position that demonstration of how many fish of each species have been or will be generated from the restored marshes is not practical.

Although it is not a requirement of the 1994 Permit and the technical tools to quantify increased production and to compare that production to biomass lost at the Station have not been fully developed by the scientific community, comments on this Draft Permit submitted by the USFWS and others continue to urge the Department to require PSEG to quantify the overall fish production from the restored wetlands and compare the production to the estimated biomass lost at the Station. Given the many environmental variables that influence fish production and populations in the Delaware estuary, and the limited scientific ability to accurately quantify all of the increased production resulting from the restored wetlands and the fish ladder installations, there is considerable uncertainty as to whether or not a scientifically credible methodology can be developed to provide “estimates” of the increased production that are in the same units as an analysis of losses at the intake structure.

Nonetheless, PSEG recognizes the Department's need to address recommendations of other interested parties and PSEG will apply the best and most current scientific approaches available to implement this proposed Permit Specific Requirement, consistent with the Department's regulatory approach relative to the incorporation of the conservation measures in the 1994 Permit.

Response to PSEG Comment 40

The Department notes PSEG's concerns regarding estimating production for the Administrative Record. However, since PSEG did not recommend any changes to the permit conditions as a result of this comment, no changes to Section G.12.b. have been made.

PSEG Comment 41, Fact Sheet

PSEG recommends that the identification of B Figure 25 (page 13) be replaced with "schematic of the non-radioactive liquid waste disposal system" consistent with the heading on page 11 of the fact sheet. Also, PSEG recommends that the statement in the third paragraph on page 13 "enter the system and concentration in the residual" be changed to "enter the system and concentrate in the residual." Lastly, PSEG recommends that the figure numbered "B Figure 31" be entitled "B Figure 31 Schematic of Station Water Flow Notes" from the Application or acknowledge that it is incorporated by reference.

Response to PSEG Comment 41

The Department hereby incorporates this information for the Administrative Record.

PSEG Comment 42, Fact Sheet

PSEG requests that the following documents be added to the Administrative Record for completeness:

31. Correspondence dated August 21, 2000 addressed to W. Boehle of NJDEP from Meredith M. Silvestri of PSEG submitting the affidavit informing of the transfer of the NJPDES Permit from PSEG to PSEG Nuclear LLC.
32. Correspondence dated August 25, 2000 addressed to D. Hammond of NJDEP from James Eggers of PSEG Nuclear LLC providing the final report of the chronic toxicity characterization study.
33. Correspondence dated May 30, 2000 addressed to D. Hammond of NJDEP from James Eggers of PSEG Nuclear LLC providing information regarding pre-treatment of well water.
34. Correspondence dated July 6, 2000 from N. Horiates of NJDEP to G. Salamon of PSEG Nuclear LLC indicating that a treatment works approval is not required for the well water pre-treatment system.
35. March 28, 2000. Plan of Action for Experimental Test Areas at Alloway Creek Watershed Wetland Restoration Site and supporting correspondence from G. Bickle (PSEG) to A. Wendolowski (NJDEP) and J. Boyer (USACE)
36. April 26, 2000. Correspondence from G. Bickle (PSEG) to A. Wendolowski (NJDEP) and J. Boyer (USACE) providing revised test area maps to support Experimental Test Area Plan of Action.
37. June 12, 2000. Plan of Action – 2 for Alloway Creek Watershed Restoration Site and supporting correspondence from G. Bickle (PSEG) to K. Broderick (NJDEP) and J. Boyer (USACE).
38. June 30, 2000. Plan of Action for Cohansey River Watershed Restoration Site and supporting correspondence from G. Bickle (PSEG) to K. Broderick (NJDEP) and J. Boyer (USACE).

39. October 4, 2000. Correspondence from G. Bickle (PSEG) to K. Broderick (NJDEP) and J. Boyer (USACE) revising Test Area Plan of Action (3/28/00) to include additional microtopography.
40. October 12, 2000. Plan of Action for Microtopography at the Alloway Creek Watershed Restoration Site and supporting correspondence from G. Bickle (PSEG) to K. Broderick (NJDEP) and J. Boyer (USACE).
41. Correspondence dated December 28, 2000 addressed to D. Hammond of NJDEP from M.F. Vaskis of PSEG providing information regarding increase in reactor power.
42. Correspondence dated January 30, 2001 addressed to S.T. Rosenwinkel of NJDEP from M.F. Vaskis of PSEG providing new information on the RMA-10 model.

Response to PSEG Comment 42 - The Department hereby notes these additions to the Contents of the Administrative Record.

Specific NJDEP Comments

NJDEP Comment 1, Part III (DSN's 481 – 486)

Because of an inadvertent error, the Department failed to include the parameter effluent temperature in Part III for DSN's 481 – 486 in its December 8, 2000 draft NJPDES renewal permit. It is clearly evident that the Department's intent was to have this parameter monitored and reported for each of these individual outfalls as indicated by item G.3.b.ii. of Part IV as well as page 14 of the Fact Sheet. Specifically, on page 14 of the Fact Sheet under the heading "DSN's 481 – 486" it is stated that "Monitoring for temperature for each individual outfall shall occur on a continuous basis". As such, the Department has included monitoring and reporting for effluent temperature in Part III.B. – G of the final permit.

NJDEP Comment 2, Part IV, G.6.a.

As a result of discussions during the June 13, 2001 MPAC/MAC Meeting, the Department has included an optional requirement for the permittee to conduct sampling gear efficiency studies as part of an improved Biological Monitoring Program as specified in item G.6.a. of this final permit. The conduct of an updated gear efficiency study was suggested by several MAC members and the Department has determined that this idea warrants further consideration.

Attachments

Attachment 1 - Table 14 entitled "Estimated Cumulative Distribution of Cooling Water System Configurations as a Function of Age for Traditional Utilities and Non-utility Power Producers." This table was distributed at the May 23, 2001 "EPA Technical Experts Panel for Section 316(b)". [referenced in Response 8]

Attachment 2 – Figure 1.1 "Interdependence of data and analyses in the Application that were reviewed by ESSA". This figure was excerpted from the June 14, 2000 ESSA Report. [referenced in Response 92]

Attachment 3A – F-2 Table 20 "Historical CMR Estimates". This table was obtained from PSEG's March 4, 1999 NJPDES renewal application. [referenced in Response 92]

Attachment 3B – F Table 6 “Summary of Model Applications to RIS and Blue Crab”. This table was obtained from PSEG’s March 4, 1999 NJPDES renewal application. [referenced in Response 92]

Attachment 4 - Table 12 entitled “Estimated Distribution of Number of Facilities Having Conducted an Environmental Technology Study by Industry Group”. This table was distributed at the May 23, 2001 “EPA Technical Experts Panel for Section 316(b)”. [referenced in Response 92]

Attachment 5 – An illustration of the relation of various components of the March 4, 1999 NJPDES application. This table was obtained from PSEG’s March 4, 1999 NJPDES renewal application. [referenced in Response 95]

Attachment 1

Table 14. Estimated Cumulative Distribution of Cooling Water System Configurations as a Function of Age for Traditional Utilities and Non-utility Power Producers **

Description: This analysis provides a national estimate for the configuration of *cooling water systems (CWSs)* by type as a function of age in the traditional utility and non-utility power producer industry categories. The percent of cooling water systems from the total national estimates that should exhibit each configuration is also provided.

CWS Age (Years)	CWS Configuration	Traditional Utilities	
		Estimated Number CWSs	Percent of CWSs
≤ 5	Total	0	0
	Once-through	3	41.7
≤ 10	Recirculating	5	58.3
	Combination	0	0
	Total	8	100
≤ 15	Once-through	7	33.4
	Recirculating	13	66.6
	Combination	0	0
	Total	20	100
All	Once-through	516	71.4
	Recirculating	168	23.3
	Combination	38	5.3
	Total	722	100
CWS Age (Years)	CWS Configuration	Non-utility Power Producers	
		Estimated Number CWSs	Percent of CWSs
≤ 5	Once-through	2	24
	Recirculating	7	76
	Combination	0	0
	Total	9	100
≤ 10	Once-through	6	32.2
	Recirculating	12	67.8
	Combination	0	0
	Total	18	100
≤ 15	Once-through	11	34.2
	Recirculating	22	65.8
	Combination	0	0
	Total	33	100
All	Once-through	91	69.5
	Recirculating	40	30.5
	Combination	0	0
	Total	131	100

Note: For facilities with multiple CWSs, the sample weight for each CWS is assumed to be the same as the survey sample weight for that facility. The distribution of non-respondents (i.e., those identified as "Unknown" above) is assumed to be the same as the distribution of respondents.

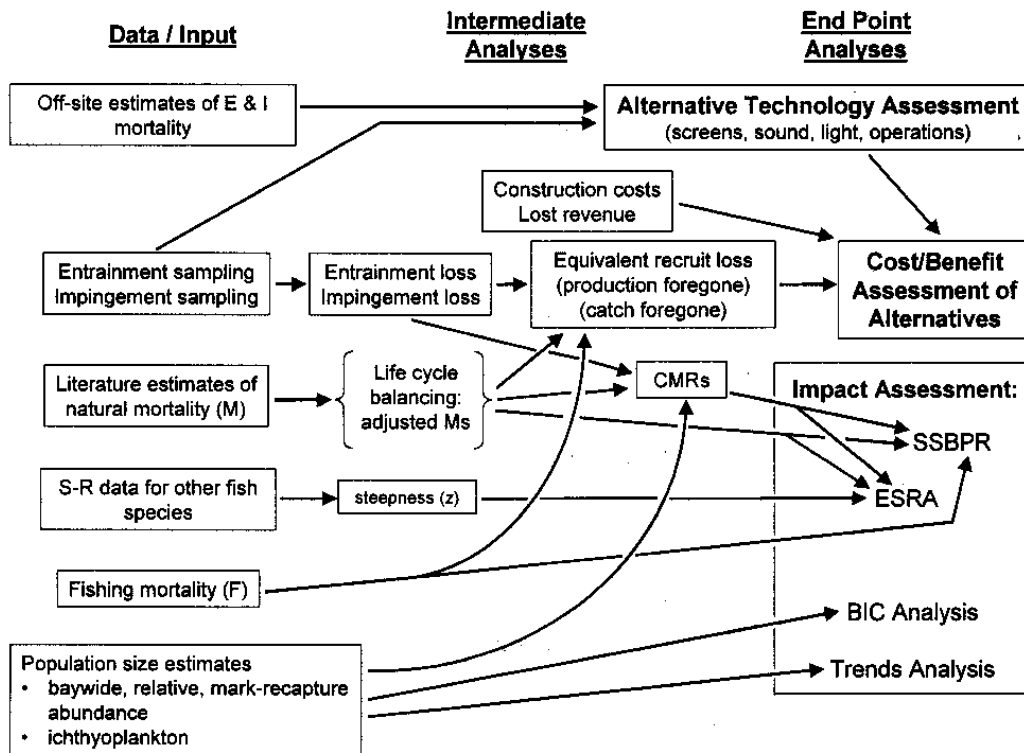


Figure 1.1: Interdependence of data and analyses in the Application that were reviewed by ESSA.

1.2.1 Site Visit and Technical Meetings

The PSE&G kindly provided the review team with full support and extensive cooperation throughout the review. A site visit of the Salem station and technical meetings among the ESSA review team and the investigators and authors of the Application were conducted as part of the review. A meeting was held in Seattle Washington with the fish population biologists. A meeting at the University of Guelph, and teleconferences linking New York, Trenton, Guelph, Toronto, and Victoria were held among the individuals who conducted and reviewed the cost/benefit analyses of the Application. The site visit and follow-up technical meeting at the Salem station focused on entrainment and impingement analyses, and the assessment of alternative technologies. The site visit and all technical meetings injected valuable insight into the review.

1.2.2 ESSA Review and Section 316(b)

The focus of the ESSA review was the technical and scientific analyses presented in the portions of the PSE&G Permit Application summarized above. Determination of the relevance and application of the results of the ESSA review to the requirements of Section 316(b) of the Clean Water Act and other

Attachment 3A

F-2 Table 20. Historical CMR Estimates.

Species	Year Class	Total CMR	Impingement CMR	Entrainment CMR
Alewife	1996	0.00000	0.000000	0.00000
American Shad	1979	0.00010	0.000100	0.00000
American Shad	1981	0.00010	0.000100	0.00000
American Shad	1982	0.00010	0.000100	0.00000
American Shad	1992	0.00100	0.001000	0.00000
American Shad	1996	0.00000	0.000000	0.00000
Bay Anchovy	1981	0.10021	0.000204	0.10002
Bay Anchovy	1982	0.14476	0.000000	0.14476
Bay Anchovy	1996	0.02271	0.000004	0.02271
Bay Anchovy	1998	0.21780	0.000021	0.21778
Blueback Herring	1996	0.00070	0.000416	0.00028
Spot	1981	0.05644	0.015632	0.04146

Attachment 3B

F-2 Table 6. Summary of Model Applications to RIS and Blue Crab.

	Loss Models			Condition Mortality Rate Models		Population Effects Models		Near-Field Relative Loss Model
	Entrainment Loss	Impingement Loss	Equivalent Recruit Loss	EEIM	ETM	ESRA	SSBPR	LDM
Opossum shrimp	✓							✓
Scud	✓							✓
Blue crab		✓						
Bay anchovy	✓	✓	✓	✓*	✓	✓	✓	
Alewife	✓	✓	✓	✓		✓	✓	
Blueback herring	✓	✓	✓	✓		✓	✓	
American shad	✓	✓	✓	✓		✓	✓	
Striped bass	✓	✓	✓				✓*	
White perch	✓	✓	✓	✓		✓	✓	
Spot	✓	✓	✓	✓		✓	✓	
Atlantic croaker	✓	✓	✓					
Weakfish	✓	✓	✓	✓*	✓	✓	✓	

* = Impingement Only

EEIM = Extended Empirical Impingement Model

ETM = Empirical Transport Model

LDM = Local Depletion Model

ESRA = Equilibrium Spawner-Recruit Analysis

SSBPR = Spawning Stock Biomass per Recruit

Attachment 4

Table 12. Estimated Distribution of Number of Facilities Having Conducted an Environmental or Technology Study by Industry Group *

Description: This analysis provides a national estimate of the *number and percent of facilities* in the traditional utility and non-utility power producer industry categories that have performed any biological studies including discrete or ongoing impingement and/or entrainment monitoring, discrete studies to evaluate the effectiveness of a technology to minimize impingement or entrainment, and Section 316(b) demonstration studies.

Conduct of Any Environmental or Technology Study	Traditional Utilities		Non-utility Power Producers	
	Estimated Number of Facilities	Percent	Estimated Number of Facilities	Percent
Yes	348	61.5	64	57.7
No	218	38.5	47	42.3
Total	566	100	111	100

Table 13. Distribution of Facility Mitigation Activities for Traditional Utilities and Non-utilities **

This analysis provides a national estimate of the *number and percent of facilities* in the traditional utility and non-utility power producer industry categories that have carried out any measures to compensate for or to mitigate potential environmental impacts.

Mitigation Measures	Traditional Utilities			Non-utility Power Producers		
	Estimated of Facilities Performing Any Mitigation Alternative	Estimated Number of Facilities	Percent	Estimated of Facilities Performing Any Mitigation Alternative	Estimated Number of Facilities	Percent
Restocking Fisheries	25	3	0.6	10	2	2.2
Maintaining Hatcheries		5	0.9		2	2.2
Habitat Restoration		2	0.3		1	1.0
Designation of Conservation Areas		4	0.7		1	1.0
Other		20	3.5		7	6.1
Total		34	6.0		13	12.5

Note: Some facilities employ more than one mitigation measure. Where this is the case, these facilities have been counted in each mitigation measure category that applies. Thus, the total number of facilities employing the various mitigation measures exceeds the total number of facilities performing mitigation

Attachment 5

